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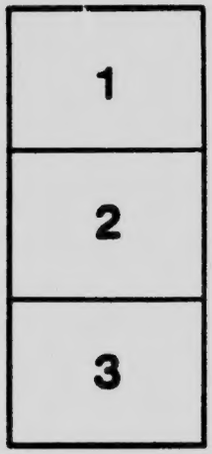

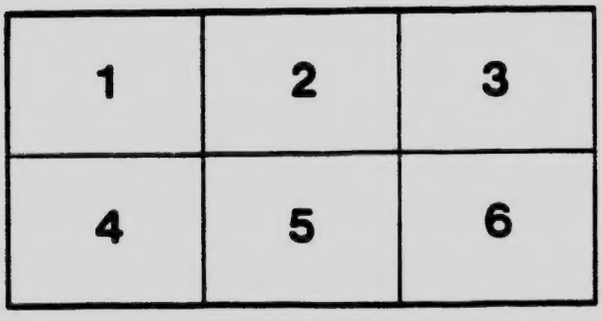

DISEASES OF WOMEN

BY THE SAME AUTHORS

MIDWIFERY

BY

TEN TEACHERS

xii + 736 pages.

With 300 Original Illustrations.

LONDON: EDWARD ARNOLD

DISEASES OF WOMEN

BY

TEN TEACHERS

UNDER THE DIRECTION OF

COMYNS BERKELEY

M.A., M.D., M.C.(Cantab.), F.R.C.P.(Lond.),

OBSTETRIC AND GYNÆCOLOGICAL SURGEON TO THE MIDDLESEX HOSPITAL, ETC., ETC.

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PREFACE

THE authors of "Midwifery" by Ten Teachers have written this companion book on "Diseases of Women," which has been prepared in the same way as its predecessor.

An effort has been made to overcome to some degree the disadvantages of collective authorship. Though the subjects dealt with have been in the first instance portioned out among the writers whose names appear on the previous page, each manuscript has been typed, manifolded and distributed among the whole body. Numerous meetings have been held, and the whole of the matter has been criticized, amended, and partly rewritten, so as to include, as far as can be, the views of all.

In other words, the whole corps has acted in an editorial and revisional capacity on every chapter and section of the book, both text and illustrations. Thus the responsibility is general, and perhaps the book will be found to have acquired more uniform characteristics than is generally possible with collective authorship.

There is more room for diversity of opinion in an account of Diseases of Women than there is in a textbook on Midwifery, and consequently it has been more difficult to give a collective opinion in some parts of this book. It is hoped, however, that the student will find it possible to appreciate the reasons for divergence of views, and that he will have no cause for bewilderment or for a feeling of dissatisfaction.

An attempt has been made to discuss the subject from the point of view of State Medicine and generally to develop the preventive attitude of mind in the student. It is with this object that a précis of the Report of the Royal Commission on Venereal Disease has been included. The psychological factor is usually neglected in textbooks of this kind. A special chapter has been devoted to it in the hope that it will suggest to the student a wider outlook over the production of disability in women and encourage him to take into consideration the character, temperament and life of each individual patient, and to estimate the importance of these factors in trying to restore her to health and efficiency.

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DISEASES OF WOMEN

SECTION I.—ANATOMY

CHAPTER I

THE FEMALE PELVIC ORGANS

THE VULVA.

The Vulva is the term applied to the external female generative organs, and includes all the visible structures from the pubes to the perineum and those that lie between the labia majora. The appearance of these parts varies considerably according to the age and parity of the individual.

The following present themselves for description (Fig. 1):

Mons Veneris.—The mons Veneris is a median projection which is produced by the junction of the labia majora, and consists of a quantity of adipose and areolar tissue under the skin. It is situated on the anterior aspect of the pubes, and in the adult is covered with hair.

Labia Majora.—The labia majora are two rounded folds which unite anteriorly to form the anterior commissure, or mons Veneris, and enclose an elliptical space which is known as the urogenital or pudendal cleft. They pass backwards towards the region of the anus, and posteriorly unite by the posterior commissure, a transverse fold which is not always present. They represent the scrotum in the male, and in young adults they are in cont[illegible] in the middle line. Each labium presents an outer and an inner [illegible]face, of which the outer is covered by skin, and after puberty is covered by hair and contains many sebaceous glands. The inner surface is smooth and moist, and somewhat resembles a mucous membrane. Each labium contains a mass of fat in which there is a large plexus of veins.

FIG. 1.—THE VULVA.

1, Labium majus; 2, labium minus; 3, fossa navicularis; 4, perineum; 5 and 6, clitoris; 7, vestibule; 8, urethral orifice; 9, vaginal orifice; 10, openings of Bartholin's ducts; 11, fourchette; 12, anus.

Labia Minora, or Nymphæ.—These are two in number, and vary considerably in size and shape. In women who have not borne children they are hidden by the labia majora, whereas in multiparæ they are usually exposed, and may even project beyond them. They consist of thin longitudinal folds which are covered by stratified epithelium, and contain connective tissue with some erectile tissue in the form of unstriped muscle fibres, and many bloodvessels and nerve endings.

Anteriorly they divide into two portions, of which the mesial join the glans to form the frenulum of the clitoris, and the lateral fuse over the glans to form a covering which is known as the prepuce of the clitoris.

Posteriorly they gradually thin out and fuse with the labia majora, or join one another in the middle line to form the frenulum labiorum or fourchette.

Clitoris.—The clitoris is situated at the anterior end of the vulva, and, although it is not tunnelled by the urethra, morphologically represents the penis of the male. It is usually rudimentary and not more than 1 inch in length. It is composed of a body and two crura.

The **corpus** or **body** of the clitoris is formed by the fusion of the crura of the clitoris. It tapers towards its distal extremity, which is surmounted by a small mass of erectile tissue known as the glans. The corpus is enclosed in a fibrous sheath from which passes an incomplete septum which divides it into the two corpora cavernosa of the clitoris. From this fibrous sheath the suspensory ligament of the clitoris passes to the anterior aspect of the symphysis pubis. The surface layer of the glans consists of a very sensitive epithelium, and it is covered by a fold of skin from the labia minora, known as the prepuce.

The **crura** are two in number, and arise from the mesial surface of the ischio-pubic rami. They fuse together just under the symphysis to form the body of the clitoris. They resemble the corpora cavernosa of the male, and each is covered by the erector clitoridis, or ischio-cavernosus muscle.

Vestibule.—The vestibule is the name given to the triangular space bounded on either side by the labia minora, above by the clitoris, and below by the anterior margin of the hymen, just above which is the orifice of the urethra.

The **fossa navicularis** is the term applied to the space between the fourchette and the posterior margin of the hymen. This fossa is obliterated by childbirth.

Vestibular Bulbs.—These are two erectile bodies which lie under the mucous membrane on either side of the vestibule. Embryologically they correspond with the corpus spongiosum of the male, and represent an incomplete fusion of its lateral halves, as they are separated by the vagina and urethra.

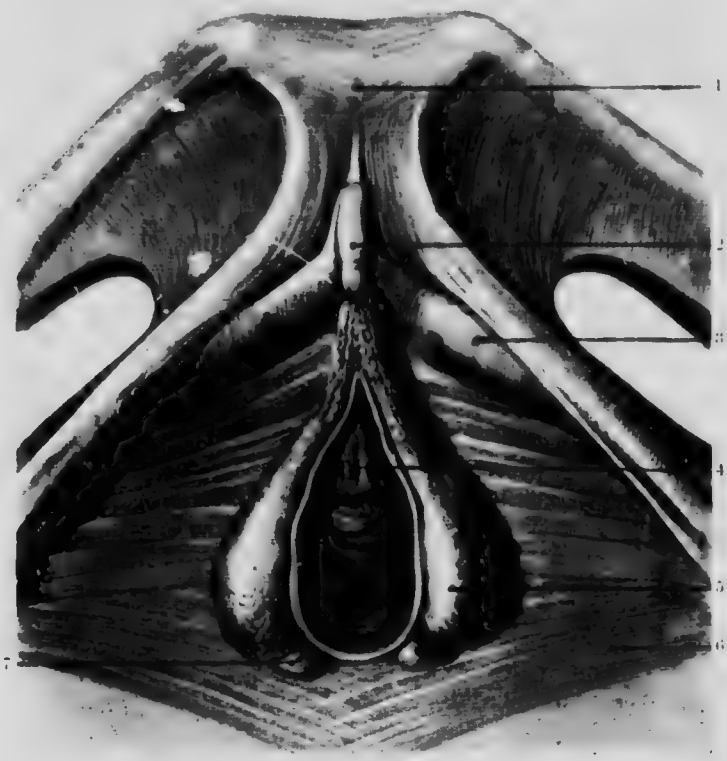


Fig. 2. Deep Structures of the Vulva.

1, Symphysis pubis; 2, clitoris; 3, crus clitoridis; 4, urethra; 5, vestibular bulb; 6, levator ani; 7, Bartholin's gland.

Bartholin's Glands.—Bartholin's glands, or glandulæ vestibulares majores, are two small compound racemose glands which lie one on each side of the vulva in the posterior part of the labium majus, and are covered by the bulbo-cavernosus or constrictor vaginæ muscles. Their ducts open in the little groove between the labium minus and the hymen. Microscopically they are compound racemose glands, with acini lined with short columnar epithelium. They secrete a clear glairy fluid. The duct is lined by similar epithelium (Fig. 2).

Vaginal Orifice.—This varies considerably is size and shape with the age and parity of the individual. In the undisturbed condition

it is completely hidden by the labia majora. The orifice is closed to a greater or less extent by a membranous fold known as the hymen.

Hymen.—The appearance and consistence of this structure vary considerably. In adult virgins it presents an aperture which differs in size from a pin-point to a finger-tip. The opening is usually circular or somewhat crescentic in shape. In rare cases the membrane is imperforate. Its consistence varies from a delicate to a tough resistant membrane. It is usually ruptured at the first coitus, although it is not necessarily so. As the result of the distension of the genital tract during childbirth, the hymen usually undergoes marked lacerations, and the remnants are represented by cicatrized projections known as the carunculæ myrtiformes.

THE VAGINA.

The vagina is a musculo-membranous passage that leads from the vulva to the uterus. Its main direction is upwards and backwards, but it is not entirely straight, as its upper part follows the curve of the rectum. Under normal conditions the anterior and posterior walls are closely applied to each other, and the canal presents on transverse section an H-shaped appearance. It meets the uterus at an acute angle, and ends above by embracing the cervix uteri, whose lower end projects into its lumen. There is thus created around this vaginal portion of the cervix, as it were, a blind vault, which is known as the fornix, and which, for purposes of description, is divided into an anterior, posterior, and two lateral portions. The vaginal attachment is higher upon the posterior than the anterior aspect of the cervix, with the result that the posterior fornix is larger than the anterior. This effect is increased by the insertion of the cervix into the anterior vaginal wall.

The length of the canal varies considerably, and is on the average about 3 inches. It is relatively longer in the newborn child. It is capable of marked distension, and is normally kept slightly moistened by a secretion of uterine origin.

Its lining is folded, and from the anterior and posterior walls project median longitudinal ridges from which transverse ridges extend. The anterior median ridge is often very well marked, especially in its lower portion, and frequently becomes more prominent during pregnancy.

The vaginal wall is covered by several layers of stratified epithelium which are continued on to the vaginal portion of the cervix right up to the internal os uteri. There are usually no glands (Fig. 3).

The epithelium lies on papillæ of connective tissue, beneath which is a strong fibro-muscular layer, separated from the rectum behind and bladder in front by loose connective tissue. It will be seen that structurally the vaginal wall resembles skin much more than mucous membrane.

Relations—*Anterior.*—Anteriorly there are two structures which are separated from the vagina by the vesico-vaginal septum: the bladder, which is loosely attached; and the urethra, which is firmly united to it.

Posterior.—Posteriorly from below upwards are the perineal body, the rectum, separated by the recto-vaginal septum, and the pouch of Douglas.

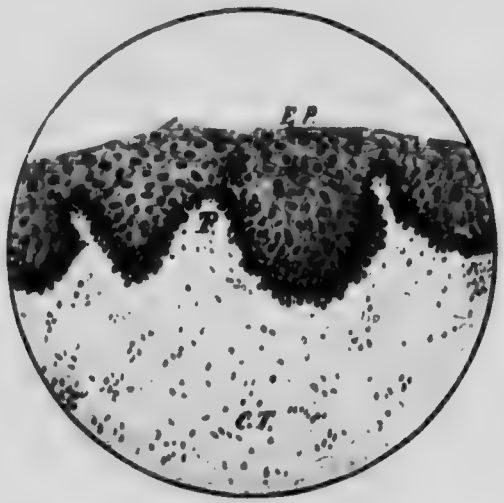


Fig. 3.—Microscopical Section of Vaginal Mucosa.

E.P., Several layers of stratified epithelium lying on *P.* (papillæ) of *C.T.* (connective tissue). Note the absence of glands.

Lateral.—Laterally it is supported by the free edges of the levatores ani muscles. The roof of the lateral fornix lies in relationship with the base of the broad ligament. The terminal portions of the ureters are in loose contact with the lateral walls of the upper portion of the vagina.

Lower, nearer the orifice, it pierces the triangular ligament, and is in relation with the vestibular bulbs and bulbo-cavernosus muscles.

At the lower extremity of the vagina there is a thin band of voluntary muscle known as the sphincter vaginæ, a specialized band

of the levator ani muscle. In rare cases this sphincter is unusually well developed.

Blood-Supply.—The vagina has an abundant blood-supply. Its upper third receives the vaginal branches of the uterine arteries, the middle third branches from the inferior vesical, and the lower third from the middle hæmorrhoidal and internal pudic arteries.

Around the vagina is a venous plexus whose branches follow the courses of the corresponding arteries, and eventually reach the internal iliac veins.

The Lymphatic Vessels.—From the lower third they run to the superficial inguinal glands, and from the upper two-thirds to the iliac glands.

Nerves.—The nerve-supply is derived from the plexus utero-vaginalis, the vesical plexus, and some twigs which come directly from the third and fourth sacral nerves.

THE UTERUS.

The uterus is a hollow organ whose thick muscular walls surround a small cavity which is lined by mucous membrane. In shape it resembles a pear which is flattened from before backwards. It lies in the pelvic cavity between the rectum and the bladder, and its inferior extremity projects into the vagina. It consists of two unequal parts: an upper portion which is triangular on coronal section, known as the corpus, or body; and a lower cylindrical portion, known as the cervix, or neck. The relative proportions of these parts vary with the age of the individual. In the child the cervix forms two-thirds of the total length of the uterus, and the body but one-third, whereas in the adult these proportions are reversed. In old age it shrinks, the muscle walls undergoing atrophy and being replaced to a large extent by fibrous tissue.

Corpus Uteri.—This consists mainly of a thick muscular wall which encloses a cavity—the uterine cavity. That part of the body which lies above a line joining the points of entrance of the Fallopian tubes is known as the fundus uteri. This portion is convex in all its aspects, and is directly continuous with the rest of the body. The walls of the cavity are practically in contact. In shape it is triangular, with the base uppermost, and the apex at the junction of the corporeal with the cervical cavity, where it is markedly narrowed, forming the internal os. At the angles formed

by the junction of the superior and lateral aspects are the openings of the Fallopian tubes (Fig. 4).

The length of the cavity is from 1½ to 2 inches, being longer in women who have borne children. It is lined by a mucous membrane which is known as the endometrium. This is a pinkish membrane on to whose surface open the mouths of numerous minute glands.

Microscopically the endometrium, which is continually undergoing changes during the sexual life of the individual, is seen to consist of a surface epithelium, glands, and stroma. The surface

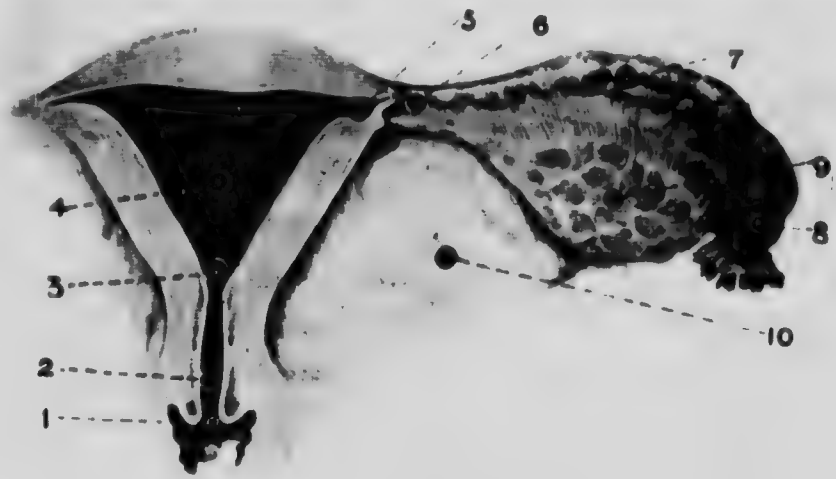


Fig. 4.—Uterus Laid [illegible] from Behind.

1, External os; 2, cervical canal; 3, internal os; 4, cavity of uterus; 5, uterine ostium and interstitial portion of Fallopian tube; 6, isthmus; 7, ampulla; 8, fimbriated extremity of Fallopian tube; 9, ovary; 10, broad ligament.

epithelium is composed of a single layer of columnar ciliated cells, whose oval nuclei are near the centre of the cells. These rest on a thin basement membrane with small nuclei. There is no submucosa. The glands are of a simple tubular type, reaching from the surface just into the internal muscle coat, and are lined by a single layer of columnar epithelial cells. They secrete a thin alkaline fluid. The stroma is composed of cells which are mostly oval in shape, communicating with one another and having lymph spaces between. There is no fibrillated connective tissue in the stroma except around some of the arterioles. The vessels are chiefly capillaries, but a few arterioles may be seen (Fig. 5).

Cervix.—The cervix is somewhat cylindrical in shape, and lies partly in the abdominal and partly in the vaginal cavity. Thus it comes to present two portions: the supravaginal and the vaginal. The vaginal wall is attached so as to surround the cervix completely, and reaches to a somewhat higher level posteriorly than anteriorly. The cavity of the cervix, whose total length is about 1 inch, is narrow and somewhat spindle-shaped, and extends from the internal os above to the external os below, where it communicates directly with the vagina. If the woman has borne no children, this orifice is nearly circular, and in front of and behind it the cervix forms two lips, which are known as the anterior and posterior lips of the cervix.

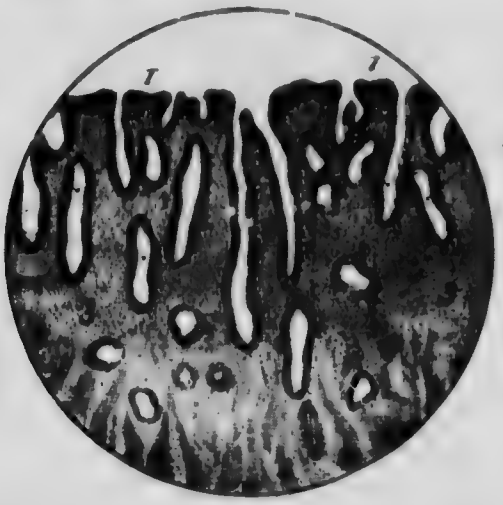


FIG. 5. MICROSCOPICAL SECTION OF THE MUCOSA OF THE BODY OF THE UTERUS.
1, Surface epithelium; 2, simple tubular glands; 3, cellular stroma; 4, muscle.
Note that there is no submucosa.

In women who have borne children there is usually a laceration, and the outline is more irregular. The direction of the cervix varies with the position of the uterus. In the usual position of the uterus, the direction of the cervix is downwards and backwards at right angles to the axis of the vagina. The cervical cavity is lined by a mucous membrane known as the cervical endometrium. This is thrown into folds, and on the anterior and posterior aspects there is a median vertical ridge from which transverse folds radiate. This arrangement is known as the arbor vitæ, and tends to be obliterated by childbirth.

Microscopically the mucous membrane is composed of an epithelial covering, glands and stroma. The epithelium is of the tall columnar

type, ciliated on the folds, but not in the furrows. The nuclei are situated at their bases. The stroma is composed of fibrillated con-

Fig. 6. Microscopical Section of the Cervical Mucosa.
1, Tall columnar ciliated epithelium; 2, glands lined by a single layer of tall epithelium; 3, stroma of fibrillated connective tissue.

Fig. 7.—Microscopical Section of the Cervical Mucosa.

nective tissue with bloodvessels, lymphatics, and nerve fibres. The glands are of two types:

(*a*) The compound racemose type of mucous gland.
(*b*) The so-called antler [illegible]

Both types of glands are lined by a single layer of tall epithelium. There is a gradual transition at the external os from the columnar to the squamous type (Figs. 6, 7).

The body of the uterus consists chiefly of involuntary muscle fibres arranged in layers which are commonly described as an inner circular and an outer longitudinal. The cervix, on the other hand, is mainly composed of fibrous tissue, with a small proportion of involuntary muscle which is chiefly arranged in a circular manner.

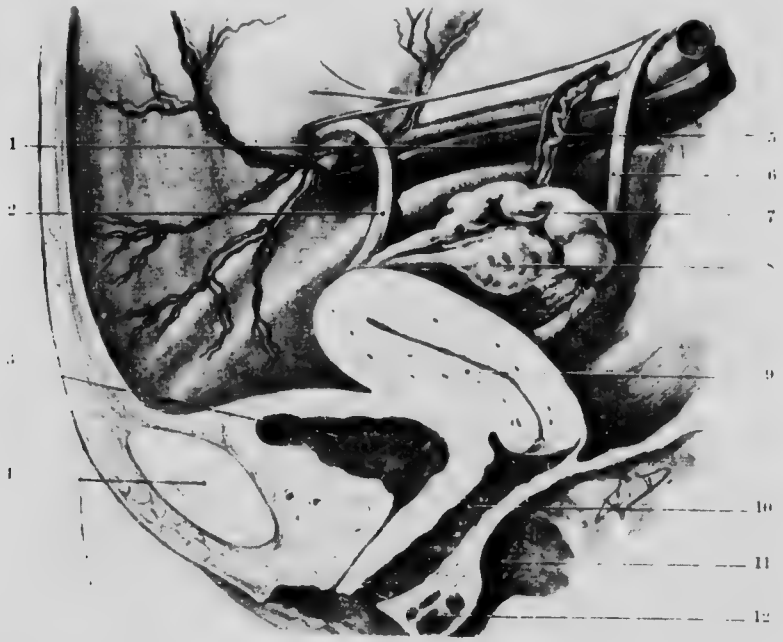


FIG. 8.—SAGITTAL SECTION OF THE FEMALE PELVIS.

1, External iliac vessels; 2, round ligament; 3, bladder; 4, symphysis pubis; 5, ovarian vessels; 6, ureter; 7, Fallopian tube; 8, ovary; 9, uterus; 10, vagina; 11, rectum; 12, perineal body.

Peritoneal Relations.—The uterus is closely invested by peritoneum, which completely covers the organ posteriorly and passes down on to the vagina. In this situation the lower part of this membrane forms the anterior boundary of the pouch of Douglas, or recto-uterine pouch. The entrance to the recto-uterine pouch is bounded laterally by two peritoneal folds which reach from the posterior aspect of the cervix to the anterior aspect of the sacrum. They embrace the rectum, and are known as the utero-sacral or recto-uterine folds. They contain a considerable amount of connective and muscle tissue, and to these structures the term sacro-

uterine or recto-uterine ligaments is applied. Anteriorly, the upper portion is covered only as far down as the internal os, the peritoneum leaving it at this level to be reflected on to the bladder, forming the utero-vesical fold or "anterior ligament of the uterus." The recess between the bladder and uterus is known as the utero-vesical pouch. The supravaginal cervix is separated from the bladder by a layer of connective tissue. Over the lower part of the body the peritoneum is much more loosely attached anteriorly, and is therefore more readily separated than it is posteriorly. Laterally the peritoneum is deflected at the margin to form the broad ligaments, which pass to the side-walls of the pelvis.

Relations of the Uterus.—As the position of the uterus is to some extent dependent on the conditions of the neighbouring viscera, its relations necessarily vary. In the position of anteversion the relations are as follows (Fig. 8):

Anteriorly in its lower portion the cervix is in direct relation with the bladder, being merely separated from it by loose connective tissue. In its upper portion the utero-vesical pouch intervenes between these two structures, and if the bladder be empty the uterus rests directly on the fundus of the bladder.

Posteriorly the uterus is in relation with the loops of small intestine or a portion of the pelvic colon, which structures occupy the pouch of Douglas.

Laterally it is in relation with the broad ligaments.

The uterine vessels turn upwards, and are in contact with the upper portion of the lateral aspect of the uterus, and the terminal portions of the ureters pass downwards and forwards in their course on the lateral aspects of the cervix, at a distance of about $\frac{3}{4}$ inch from it.

The lowest part of the cervix is enclosed in the vagina.

Blood-Supply.—The arterial supply comes from the uterine and ovarian arteries (Figs. 9, 10).

The uterine veins form a plexus, and return the blood to the tributaries of the internal iliac veins. The right ovarian vein joins the inferior vena cava, the left joins the left renal (see p. 26).

Lymphatic Vessels (Figs. 11, 19)—*From the Body.*—From the body the lymphatics are distributed to two groups of glands:

(*a*) The majority join those from the ovarian region, and end in the upper group of lumbar glands surrounding the aorta at about the level of the kidneys.

(*b*) A few run along the round ligaments to the inguinal glands.*

* This is an anatomical point. Clinically the inguinal glands are never affected by carcinoma of the body of the uterus.

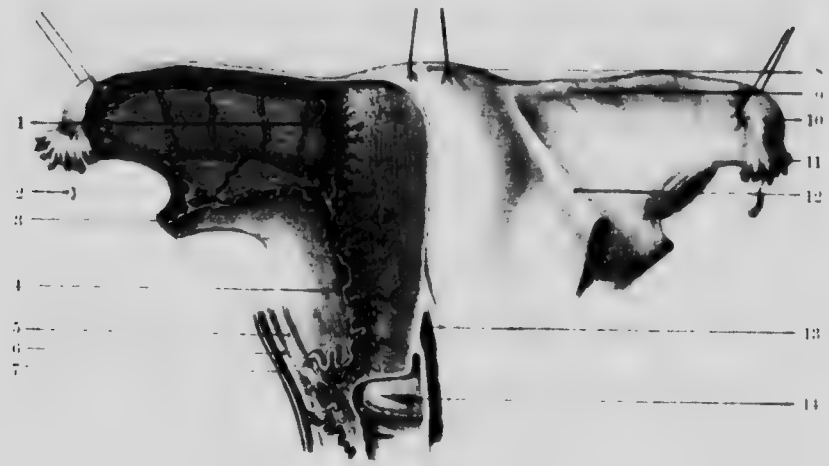


FIG. 9.—ANTERIOR VIEW OF THE UTERUS, TUBES, OVARIES, AND BLOOD-SUPPLY.

1, Vessels of round ligament; 2, hydatid of Morgagni; 3, ovarian vessels; 4, uterine vessels; 5, ureter; 6, internal iliac artery; 7, internal iliac vein; 8, fundus of uterus; 9-11, Fallopian tube; 9, isthmus; 10, ampulla; 11, fimbriated extremity; 12, round ligament; 13, cavity of bladder; 14, external os.

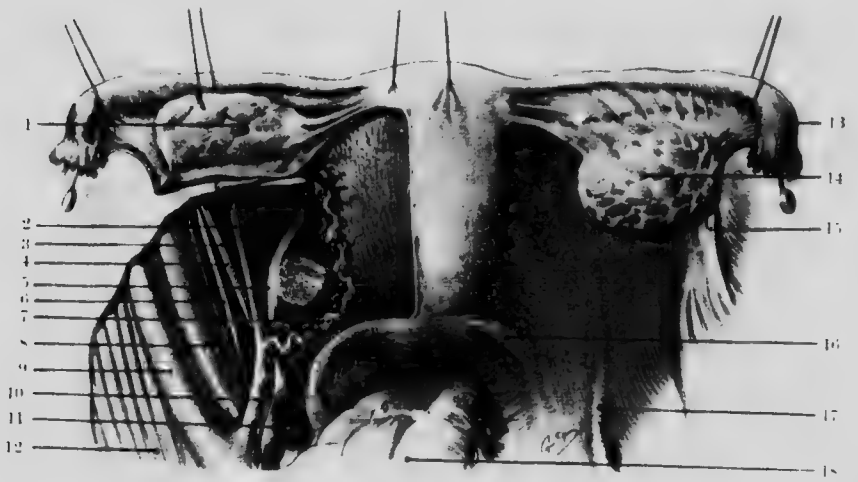


FIG. 10.—POSTERIOR VIEW OF THE PELVIC ORGANS AND BLOOD-SUPPLY.

1, Ovary; 2, obliterated hypogastric artery; 3, obturator vein; 4, obturator artery; 5 and 11, ureter; 6, obturator nerve; 7, uterine vessels; 8 and 9, external iliac vein and artery; 10, internal iliac artery; 12, psoas; 13, Fallopian tube; 14, ovary; 15, ovario-pelvic ligament; 16, utero-sacral ligament; 17, ureter; 18, rectum.

From the Cervix.—The lymphatics end in the hypogastric (iliac) glands, situated in the space between the external and internal iliac arteries.

The Nerve-Supply.—The nerve-supply is of twofold origin:

(*a*) Sympathetic.
(*b*) Cerebro-spinal.

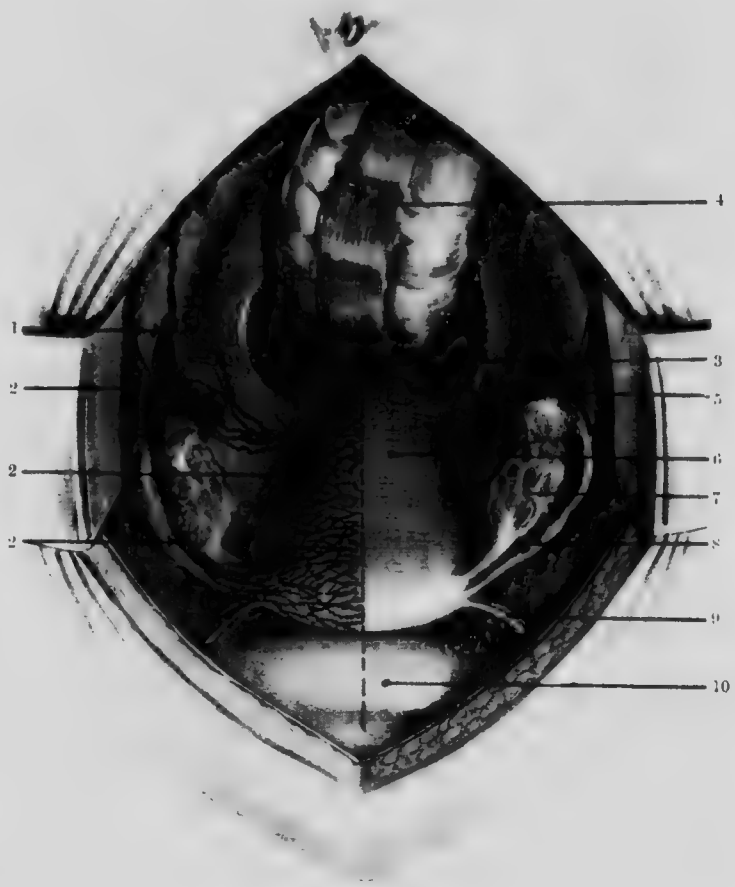


Fig. 11.—Lymphatic Vessels of the Uterus.

1, Iliac glands; 2, lymphatic vessels; 3, Douglas's pouch; 4, rectum; 5, utero-sacral ligament; 6, uterus; 7, ovary; 8, Fallopian tube; 9, round ligament of uterus; 10, bladder.

It is chiefly derived from the sympathetic system, and comes from the cervical ganglion or plexus utero-vaginalis, which is situated in the neighbourhood of the cervix. This plexus is connected above

with the hypogastric plexus, and anteriorly with the plexus vesicalis. Fibres from the third and fourth sacral nerves also contribute to the supply of the uterus.

THE OVARIES

The ovaries are two almond-shaped solid organs, somewhat flattened from side to side, which lie against the lateral wall of the upper part of the true pelvis. The ova are developed in them and are discharged from them.

In size and appearance they vary considerably according to the age of the patient, their average measurements being from 1 to 1½ inches in length, ¾ inch in breadth, and ½ inch in thickness. After the menopause they undergo a very marked diminution in size, and in old age they are very small. The surface is studded with small clear vesicles—the Graafian follicles—in young women and becomes more corrugated as age advances.

The position of the ovary varies considerably. The long axis is vertical in the upright posture, and becomes horizontal in the supine posture. It projects freely into the abdominal cavity, and is not covered by peritoneum except at its hilum, where it is attached to the posterior layer of the broad ligament by a very short mesentery known as the mesovarium. It is attached to the lateral pelvic wall by the ovario-pelvic fold, which passes from its upper pole. In this fold the ovarian vessels run on their way to the hilum. The ovarian ligament stretching from the lower pole attaches it to the cornu of the uterus at a point below and behind the entrance of the Fallopian tube. The tubal extremity is connected to the long fimbria known as the fimbria ovarica.

Relations of the Ovary.—The *lateral aspect* of the ovary lies against the peritoneum of the lateral pelvic wall in a small depression known as the ovarian fossa. This reaches forward as far as the obliterated hypogastric (umbilical) artery, and posteriorly into the angle caused by the bifurcation of the common iliac arteries.

In the floor of the fossa lie the obturator vessels and nerve, and the external iliac vein in its upper part. The ovary does not as a rule lie high enough to be in contact with the external iliac artery.

Posteriorly lie the ureter and the internal iliac vessels, covered by peritoneum.

Anteriorly it is connected to the posterior aspect of the broad ligament.

Mesially it is covered chiefly by the Fallopian tube, which separates it from the pelvic colon or coils of small intestine. Its lower extremity is practically resting on the peritoneum covering the pelvic floor.

Microscopic Appearance.—On section the ovary is found to consist chiefly of connective tissue, which is known as the stroma, and is composed of spindle-shaped cells. It is covered by a

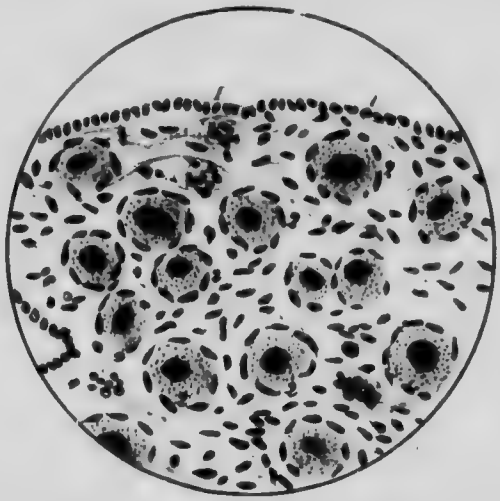


FIG. 12.—MICROSCOPICAL SECTION OF THE OVARY OF A CHILD.
1, Capsular epithelium; 2, primordial egg-cells.

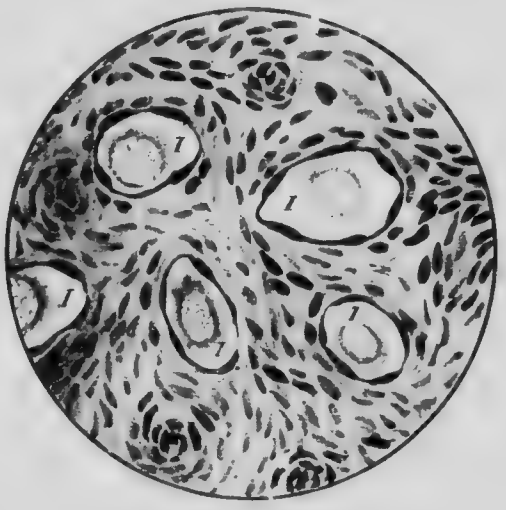


FIG. 13. MICROSCOPICAL SECTION OF THE OVARY OF AN ADULT
1, Primordial follicles containing egg-cells.

layer of small columnar cells, which represents the persistent portion of the embryonic germinal epithelium, continuous with the peritoneal epithelium forming the mesovarium. A number

of vesicles of different sizes, known as the Graafian follicles, are interspersed throughout the stroma, and a variable number of them can be seen through the surface epithelium. These follicles contain the ova. They are of varying sizes, and are found at

Fig. 14.—Diagram of Developing Graafian Follicle.

1, Liquor folliculi; 2, ovum; 3, follicular epithelium.

different depths from the surface. Each follicle has its capsule—the theca folliculi—which is formed by a differentiation of the neighbouring stroma, and contains epithelium and an ovum. The follicles and their contained ova are derived from the germinal

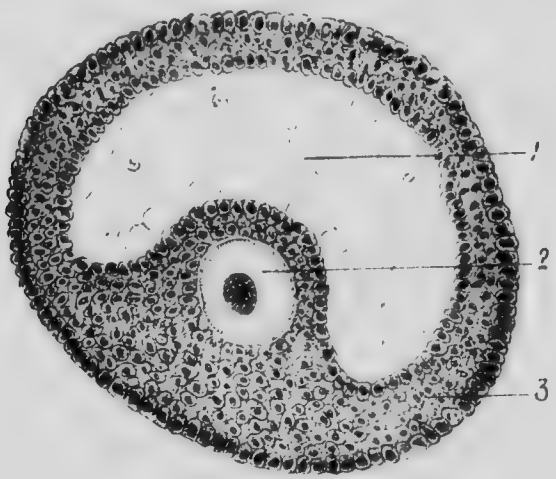


Fig. 15.—Ripe Graafian Follicle.

1, Liquor folliculi; 2, ovum; 3, follicular cells.

epithelium, which in the embryo covers the ovary. Branching tube-like processes bud down from the surface into the interior of the ovary, and these become broken up in the stroma into nests of cells, from which the Graafian follicles and the future ova are developed. Certain of these cells are larger than others, and give

a comparatively early indication of the future ova, which are surrounded by the remaining cells of these processes. In the earliest stages of the follicles the ovum is small and surrounded by a single layer of cells. In the next stage the epithelium is in two layers, and is now columnar, while still later a fluid known as the liquor folliculi accumulates between the two epithelial layers, which are separated by it except at one spot where they remain in contact. At this spot the mass of cells which surrounds the ovum is known as the discus proligerus, or the cumulus oöphorus, and the layer which lines the cavity of the follicle is known as the membrana granulosa.

In the final stage the follicular fluid has increased in amount, the follicle has reached the surface of the ovary, and projects from its surface. It then ruptures, and discharges the liquor folliculi with the contained ovum (Figs. 12, 13, 14, 15).

Blood-Supply.—1. The ovarian arteries, which come from the anterior aspect of the abdominal aorta just below the level of the origin of the renal vessels.

2. The uterine arteries, which send branches which anastomose with the ovarian.

The venous return is by a plexus of veins—the pampiniform plexus—whose tributaries join up to form two veins which accompany the corresponding artery anterior to the external iliac artery, anterior to the psoas and ureter, and deep to the peritoneum. As a rule these two vessels eventually unite to form one, which on the right side passes behind the last piece of the ileum and third part of the duodenum to the inferior vena cava, and on the left side behind the commencement of the pelvic colon to the left renal vein.

The Lymphatic Vessels.—The lymphatic vessels pass to the upper group of lumbar glands in association with those from the body of the uterus.

Nerve-Supply.—This is chiefly derived from the renal plexus, branches from which accompany the ovarian artery. It is also supplied from the aortic plexus, and receives fibres from the posterior roots of the tenth thoracic nerve.

THE UTERINE OR FALLOPIAN TUBES.

The Fallopian tubes are two in number, and stretch one on either lateral aspect of the uterus from its cornu to the corresponding ovary. They communicate directly with the uterine cavity, and convey the ova into it from the Graafian follicles. They run in the

upper margins of the broad ligaments, a special portion of which, known as the mesosalpinx, encloses them, so that they are completely covered by peritoneum except on their lower aspects. They are about 4 inches in length, and open into the pelvic cavity in the neighbourhood of the ovary, this opening being known as the ostium abdominale. For purposes of description each tube is divided into four parts (Fig. 16):

1. The interstitial.
2. The isthmic.
3. The ampullary.
4. The infundibular.

The interstitial portion lies within the muscle wall of the uterus, while the isthmus is the narrow portion adjoining the uterus, and

FIG. 16.—FALLOPIAN TUBE.

1, Interstitial part of Fallopian tube; 2, isthmus of Fallopian tube; 3, ampulla; 4, abdominal ostium; 5, mesosalpinx; 6, ovary; 7, ovarian vessels and suspensory ligaments; 8, ovarian ligaments; 9, mesovarium (broad ligaments); 10, cavity of uterus.

passes into the widest and longest portion, known as the ampulla. This in its turn terminates laterally in a fimbriated extremity known as the infundibulum. In this fimbriated extremity the tube opens directly into the peritoneal cavity by a funnel-shaped opening which is surrounded by finger-like processes known as fimbriæ, into which the muscle coat does not extend, but whose inner surfaces are covered by mucous membrane similar to that lining the tube itself, while their outer surfaces are covered by peritoneum. Of these fimbriæ, one in particular, which is longer than its fellows, extends to and partly embraces the circumference of the ovary. Hence it is known as the ovarian fimbria. The Fallopian tube frequently has developmental errors, amongst which are diverticula and accessory ostia.

The tube is invested by peritoneum in just the same manner as the small intestine, the mesosalpinx corresponding to the mesentery. There is thus a small portion of the tube wall which has no peritoneal covering (see Fig. 22). Beneath the peritoneum is the muscular wall in which the muscle fibres are arranged in two layers —an inner circular and an outer longitudinal. Internal to the muscle is the mucous membrane, which consists of a layer of epithelium with a varying amount of cellular stroma which resembles that of the endometrium. The mucous membrane is raised up into a number of branched folds or plicæ which run longitudinally. The lumen of the ampullary portion is almost filled by these folds. In the folds is a fairly rich cellular stroma, but between their bases the epithelium is separated from the muscle by a very scanty amount of stroma. There is no submucosa and there are no glands. The epithelial cells are ciliated, the cilia acting in the direction of the uterus.

Blood-Supply.—The tubes are supplied by branches from the uterine and ovarian arteries.

The venous return is by the corresponding veins.

Lymphatics.—These run to the lumbar glands in company with those from the uterine body and ovary.

Nerve-Supply.—From the plexuses in connection with the ovary and uterus, and probably some fibres from the eleventh and twelfth thoracic and first lumbar nerves.

THE FEMALE BLADDER, URETHRA, AND URETER.

Bladder.

The relations of the female bladder are—

Anteriorly, the pubic bones.

Posteriorly, the uterus. In normal conditions the anterior wall of the uterus is in contact with the posterior wall of the bladder, the vesico-uterine pouch being only a potential cavity, but when the uterus is retroverted small intestine intervenes between the two organs.

The base of the bladder is in relation with the cervix uteri and the anterior vaginal fornix, a small quantity of loose connective tissue, the anterior parametrium, intervening.

When the bladder is empty a catheter can be passed in to a distance of 5 to 5½ inches from the orifice of the urethra. A catheter passes the same distance into a bladder which is full but not abnor-

mally distended. The bladder is, however, capable of great distension, and may reach to a point above the umbilicus.

Any tumour in the pelvis which has reached a size as great as that of the uterus when three months pregnant, or of a fœtal head, is likely to cause retention of urine by pressing the base of the bladder or the urethra against the symphysis pubis.

When the cervix is displaced upwards, or upwards and forwards, by the pressure of a large swelling in the pouch of Douglas, the urethra on account of its close connection with the cervix is pulled upwards and stretched with the result that retention of urine is likely to occur. The same result is brought about when the uterus is retroverted and considerably enlarged either by pregnancy or by a tumour. Carcinoma of the cervix frequently spreads forwards into the base of the bladder. Prolapse of the anterior wall of the vagina is invariably accompanied by prolapse of the bladder (cystocele).

Urethra.

The female urethra is $1\frac{1}{2}$ inches long. In its lower two-thirds it is in close contact with the anterior vaginal wall, while in its upper third it is separated from the vagina by a small amount of loose cellular tissue. In the mucous membrane are numerous compound racemose glands, which, rarely, may form cysts which occasionally suppurate. In the floor of the urethra, near the meatus, are situated Skene's tubules, a pair of specially developed glands. The female urethra can be dilated with ease, and with safety up to a diameter of 1 inch.

Ureter.

The female ureter is about 12 inches long. It runs obliquely downwards and inwards to reach the brim of the pelvis. In the upper part of its course it lies on the psoas muscle behind the peritoneum, and is crossed obliquely from within outwards by the ovarian vessels. At the brim of the pelvis it lies on the common iliac or external iliac artery. In the pelvis it runs (1) downwards to a point about half an inch above the ischial spine, crossing the internal iliac artery; then (2) downwards, forwards and inwards through a fibrous tunnel in the base of the broad ligament, passing under the uterine artery from behind forward, separated from the artery by the plexus of uterine veins; (3) forwards about $\frac{3}{4}$ inch outside the cervix uteri; and then (4) runs close to the upper part of the vagina to enter the base of the bladder, separated from its fellow by a space of $1\frac{1}{2}$ to 2 inches.

Its close relation to the cervix and to the uterine artery is a

source of danger during the operation of hysterectomy, especially in the case of an extensive operation for carcinoma of the cervix. It may be included in a ligature, or in a suture, or may be bruised and so completely separated from surrounding tissues that a portion of it may slough.

If carcinoma of the cervix spreads into the connective tissue of the broad ligament the ureter may be invaded by the growth.

It may be considerably displaced and lengthened by cervical fibroids, and by tumours burrowing in the broad ligament. When these tumours are raised from the pelvis the ureter may be pulled up with them and is in danger of being injured.

THE RECTUM.

A detailed description of the anatomy of the rectum is unnecessary in a textbook on Diseases of Women, but a short account of its anterior relations is essential. Above it is covered by the peritoneum of Douglas's pouch, below this level it is separated from the posterior wall of the vagina by the recto-vaginal septum, and, at its lower end, by the perineal body.

The rectum and vagina are both only potential cavities, consequently a finger inserted into the rectum feels the cervix, when it occupies its normal position, as a small firm object pressed against the anterior wall of the rectum.

A bimanual examination of the pelvis can be made with a finger in the rectum instead of the vagina if vaginal examination is contra-indicated.

Swellings and collections of fluid in Douglas's pouch can often be felt better by rectal than by vaginal examination.

Thickening of the bases of the broad ligaments and the utero-sacral ligaments, whether due to inflammatory exudation or to spread of carcinoma, can be investigated more thoroughly by rectal than by vaginal examination.

CHAPTER II

BLOODVESSELS, NERVES, AND LYMPHATICS OF THE PELVIS

The arterial supply of the pelvic organs comes from the following sources (Fig. 17):

1. The anterior divisions of the internal iliac arteries.
2. The ovarian arteries.
3. The superior hæmorrhoidal artery.

THE INTERNAL ILIAC ARTERY.

In the adult the internal iliac artery is a short vessel, and is usually about 1½ inches in length. It begins at the bifurcation of the common iliac artery opposite the lumbo-sacral articulation, and passes downwards and backwards into the pelvis, and, at the upper margin of the great sacro-sciatic foramen, terminates by dividing into anterior and posterior divisions.

The Anterior Division of the Internal Iliac Artery.—This division gives off eight branches, three of which are parietal in their distribution, and five visceral.

Parietal.	*Visceral.*
1. Obturator.	1. Superior vesical.
2. Internal pudic.	2. Inferior vesical.
3. Sciatic.	3. Middle hæmorrhoidal.
	4. Uterine.
	5. Vaginal.

The Obturator Artery runs forward in the extraperitoneal fat with the obturator nerve and vein, along the lateral wall of the pelvis, to the obturator foramen, through the upper part of which it passes out into the thigh.

The Internal Pudic Artery gives off the superficial perineal branch which supplies the labia, and then divides into the dorsal artery of the clitoris which supplies the dorsum of that organ and ends in

the glans clitoridis and preputium clitoridis, and the artery to the corpus cavernosum which supplies the cavernous body of the clitoris.

The Sciatic Artery passes out of the pelvis through the lower part of the great sacro-sciatic foramen.

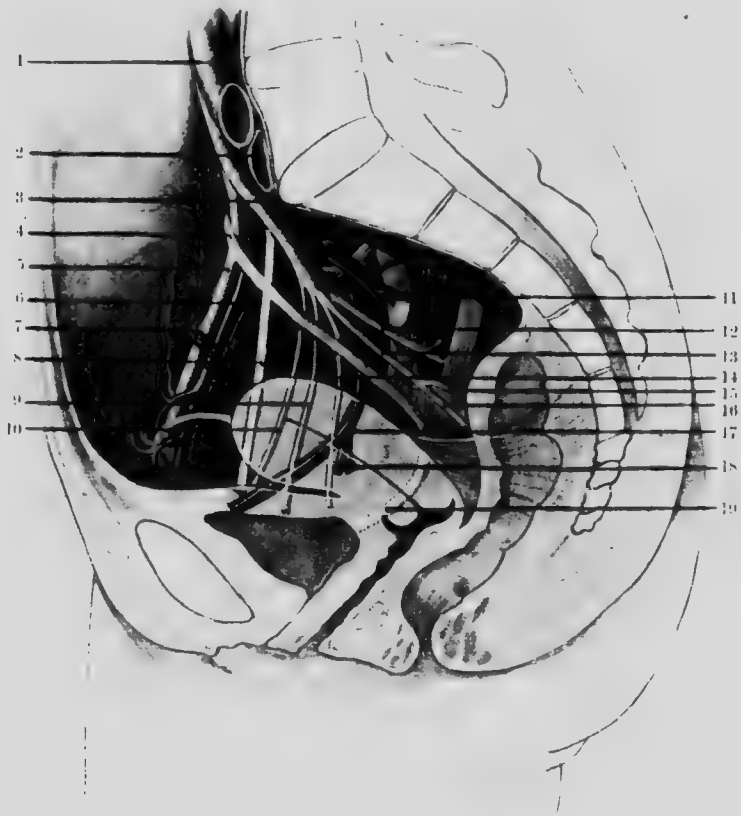


FIG. 17. – EXTERNAL ILIAC AND HYPOGASTRIC (INTERNAL ILIAC) VESSELS.

1, Left common iliac artery; 2, left common iliac vein; 3, hypogastric artery (internal iliac); 4, ureter; 5, external iliac artery; 6, external iliac vein; 7, ovarian veins; 8, obturator nerve; 9, umbilical artery (superior vesical); 10, obturator artery; 11, hypogastric vein, 12, superior gluteal artery; 14, uterine artery; 15, inferior gluteal artery; 16, internal pudendal artery; 17, obturator vein; 18, uterine vein (for sake of diagram, represented as entering the obturator vein. It usually runs to the hypogastric vein); 19, ureter.

The Superior Vesical Artery supplies the superior and lateral surfaces of the bladder.

The Inferior Vesical Artery crosses in front of the ureter to reach the base of the bladder.

The Middle Hæmorrhoidal Artery is mainly distributed to the muscle coats of the rectum, anastomosing with the superior and inferior hæmorrhoidal arteries. It also gives some twigs to the bladder.

The Uterine Artery arises from the anterior division of the internal iliac artery. It first runs downwards and forwards, and then turns inwards along the lower border of the broad ligament, crossing superficially to the ureter in this part of its course, very rarely passing deep to the ureter. Thence it passes above the lateral fornix of the vagina and upwards between the layers of the broad ligament, running a sinuous course along the lateral aspect of the uterus, where it ends below the level of the Fallopian tube by anastomosing with the branches of the ovarian artery.

It gives off branches to the vagina, the uterus, the isthmus of the Fallopian tube, and frequently to the ovary itself.

The Vaginal Artery runs inwards from the anterior division of the internal iliac vessel, and supplies branches to the vagina. It also gives twigs to the base of the bladder and the rectum. It is frequently represented by more than one branch.

THE OVARIAN ARTERY.

The ovarian artery arises directly from the abdominal aorta just below the renal artery, and, on reaching the pelvis, enters it by crossing the external iliac vessel, and comes to lie between the two layers of the ovario-pelvic fold of the broad ligament. Thence it passes to the ovary, which it enters at the hilum. In addition to supplying this organ, it sends branches which run between the layers of the broad ligament to the Fallopian tube, and branches to anastomose with those that come from the uterine artery.

THE SUPERIOR HÆMORRHOIDAL ARTERY.

The superior hæmorrhoidal artery, the direct continuation of the inferior mesenteric artery, enters the base of the pelvic mesocolon, and in it descends as far as the third sacral vertebra. It here divides into two branches which proceed one on either side of the rectum and supply numerous smaller branches to it. They anastomose with the branches of the middle and inferior hæmorrhoidal arteries.

VEINS OF THE PELVIS.

The veins of the pelvis correspond fairly closely with the arteries, but there are the following differences:

1. The veins round the bladder, rectum, uterus, and vagina are numerous, and form plexuses which communicate freely with one another.

2. The dorsal vein of the clitoris ends in the vesical plexus.

3. The ilio-lumbar and middle sacral veins open into the common iliac veins.

Plexuses.—The Vesical Plexus surrounds the neck and base of the bladder, and is supported on the sides of the bladder by the reflection of the pelvic fascia.

The Hæmorrhoidal Plexus surrounds the lower end of the rectum, and from it the blood is carried away by the (*a*) superior hæmorrhoidal vein to the inferior mesenteric vein; (*b*) middle hæmorrhoidal veins to the internal iliac veins; (*c*) inferior hæmorrhoidal veins to the internal pudic veins.

The Uterine Plexus is situated between the layers of the broad ligament on either side of the uterus. It anastomoses freely with the ovarian veins. The vein issues on either side and ascends in the floor of the ovarian fossa, and terminates in the corresponding hypogastric vein.

The Vaginal Plexus surrounds the vagina, being especially well marked round the lower portion. It communicates posteriorly with the hæmorrhoidal plexus, and anteriorly with the vesical plexus. From these plexuses corresponding veins pass to pour their blood as tributaries of the internal iliac vein.

The Hypogastric, or Internal Iliac Vein.—The internal iliac vein is formed by the junction of the venæ comites of the branches of the internal iliac artery. It lies at first to the inner side and posterior to the corresponding artery, and ends opposite the sacro-iliac joint by uniting with the external iliac vein to form the common iliac vein.

The Ovarian Veins.—The ovarian veins are usually two in number, and are formed from a plexus of veins, the so-called pampiniform plexus, which issues from the hilum of the ovary. This plexus lies between the layers of the broad ligament, and from it two veins issue which accompany the corresponding ovarian artery, and fuse higher up to form a single vein which ends on the right side in the inferior vena cava, and on the left side in the left renal vein.

NERVES OF THE PELVIS.

The pelvis is supplied with nerves from both the spinal and the sympathetic systems.

In connection with the spinal supply there are two pelvic nerve plexuses—the lumbo-sacral and the sacro-coccygeal.

The Lumbo-Sacral Plexus.—The pelvic portion of the lumbo-sacral plexus, which rests at first on the anterior aspect of the pyriformis muscle, derives its constituent parts from the anterior primary divisions of the fourth and fifth lumbar and the first four sacral nerves. Of its branches *the Pudendal Band* divides into its terminal divisions—the perineal nerve and the dorsal nerve of the clitoris.

The Perineal Nerve gives off:

(*a*) Anterior and posterior superficial perineal branches which supply the skin of the labium majus.
(*b*) Muscular branches to the perineal muscles.
(*c*) Branch to the bulb of the vagina.

The Dorsal Nerve of the Clitoris, which accompanies the pudic artery between the two layers of the triangular ligament, and pierces the more superficial of them about half an inch below the symphysis pubis, accompanies the dorsal artery of the clitoris, and is finally distributed to the glans.

The Sacro-Coccygeal Plexus.—The sacro-coccygeal plexus is formed by the lower branch of the fourth sacral, the fifth sacral, and the coccygeal nerves. *The Fourth Sacral Nerve* supplies twigs to the coccygeus and levator ani muscles, and white rami communicantes to the pelvic sympathetic system. *The Fifth Sacral Nerve* and *the Coccygeal Nerve* pierce the substance of the coccygeus muscle, to which they give twigs of supply.

THE PELVIC SYMPATHETIC NERVES.

The pelvic portions of the sympathetic cords are situated on the anterior aspect of the sacrum, and lie along the inner side of the anterior sacral foramina. They are continuous above with the lumbar portion of the cord, and consist on each side of four or five small ganglia connected by interganglionic cords. These cords converge below, and unite in front of the coccyx in a small ganglion known as the ganglion impar. Each ganglion is connected with one of the sacral nerves by a grey communicating root. Other branches are given off from the ganglion to the anterior surface of the sacrum, and to the pelvic plexuses above, and the parts about the coccyx and the coccygeal body below.

The Hypogastric Plexus lies on the anterior aspect of the fifth lumbar vertebra. Secondary plexuses are thus formed, of which the following are described:

1. *The Hæmorrhoidal Plexus*, which arises from the pelvic

plexuses, and with the branches from the superior hæmorrhoidal plexuses supplies the rectum.

2. *The Vesical Plexus*, which consists of fibres accompanying the vesical arteries, is distributed to the bladder.

3. *The Uterine Plexus*, which ascends between the layers of the broad ligament along the uterine artery, is distributed to the uterus.

4. *The Ovarian Plexus*, which is derived from the aortic and renal plexuses, accompanies the ovarian artery. It is distributed to the ovary.

5. *The Vaginal Plexus*, which is derived chiefly from the visceral branches entering the pelvic plexus from the third and fourth sacral nerves, supplies the vagina.

LYMPHATICS OF THE PELVIS.

The pelvic system of lymphatics consists of an intricate network of lymph vessels which contain a colourless fluid called lymph. Interposed along their course is a series of aggregations of lymphoid tissue, and these are known as lymphatic glands. The lymph vessels that carry the lymph to the glands are known as vasa afferentia, or afferent vessels; while those that convey it from the peripheral to the more central glands are spoken of as vasa efferentia, or efferent vessels.

Lymphatic Glands.—The lymphatic glands of the pelvis are best described in parietal and visceral groups.

The Parietal Group.

The parietal group of lymphatic glands consists of the common iliac, external iliac, internal iliac, and sacral glands (Fig. 18).

Common Iliac Glands.—These glands lie along the course of the common iliac vessels. They receive afferent vessels from the external and internal iliac glands, and from them the lymph passes into the lumbar glands.

External Iliac Glands.—These glands lie along the external iliac vessels. They receive afferent vessels from the inguinal, deep epigastric and deep circumflex iliac glands, urethra, bladder, vagina, and cervix. The efferents pass to the common iliac glands.

Internal Iliac, or Hypogastric Glands.—These glands lie in the angle subtended by the external and internal iliac vessels, near the origins of the main branches of these vessels. They receive afferent vessels from the cervix uteri and from the regions supplied by the

main branches of the internal iliac vessels. Their efferents pass to the common iliac glands.

Sacral Glands.—These glands lie along the anterior aspect of the sacrum, in relation with the anterior sacral foramina. They receive afferent vessels from the rectum, cervix uteri, and adjacent parts of the pelvic wall. Their efferents end in the aortic and internal iliac glands.

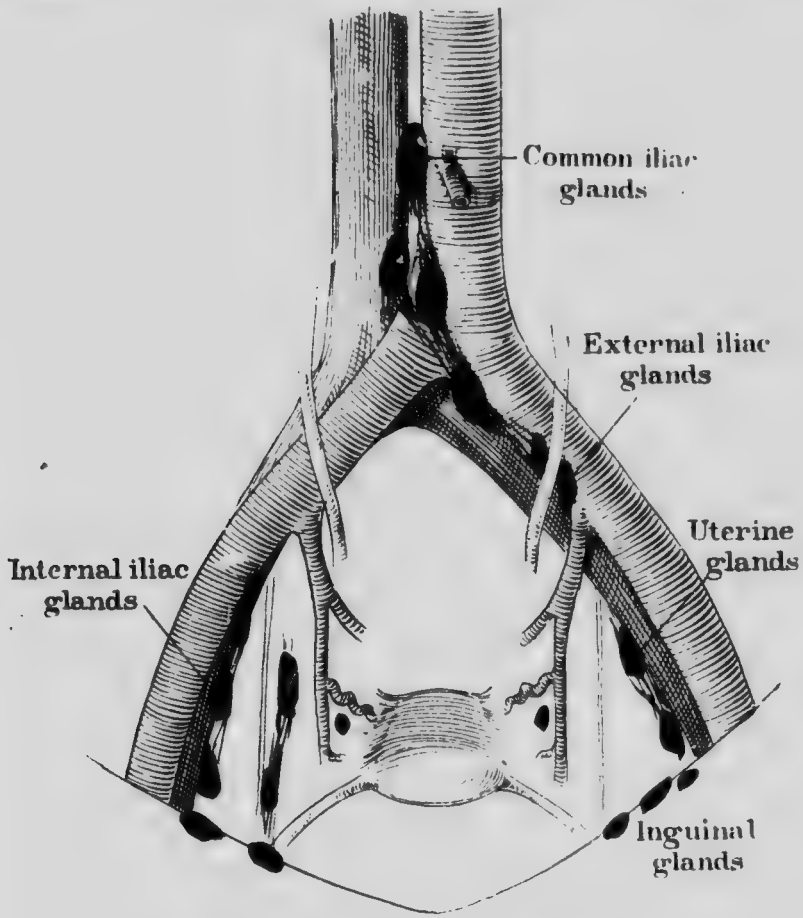


FIG. 18.—LYMPHATIC GLANDS OF THE PELVIS.

THE VISCERAL GROUP.

The visceral group of lymphatic glands consists of the vesical, rectal, and uterine glands.

Vesical Glands.—These vesical glands may be divided into an anterior and a lateral group.

1. The anterior group lies in the retropubic fat, and its efferents pass to the external iliac glands.

2. The lateral group lies on either side of the bladder, along the course of the obliterated hypogastric vessel, and its efferents end in the external iliac glands.

Rectal Glands.—These glands may be divided into an upper and a lower group.

1. The upper group lies along the course of the superior hæmorrhoidal vessels, and its efferents end in the inferior mesenteric glands.

2. The lower group lies in relation with the ampullary part of the rectum, and its efferents pass to the superior hæmorrhoidal glands.

Uterine Glands.—These glands lie in the base of the broad ligament at the sides of the cervix, in close relation to the uterine arteries. The efferents pass to the internal iliac glands.

Lymphatic Vessels.—The lymphatic vessels of the pelvis form therein an intricate network of vessels which convey the lymph from the various structures towards the central glands. Those vessels running from the individual structures will be described separately for the sake of clearness, but it should be understood that there is a considerable amount of overlapping (Fig. 19).

The Lymphatic Vessels of the Bladder.—The lymphatic vessels from the antero-lateral aspect of the bladder pass to the lateral group of glands, and thence to the external and internal iliac glands.

The lymphatic vessels from the superior aspect of the bladder pass to the external and internal iliac glands.

The lymphatic vessels from the posterior aspect of the bladder pass to the aortic glands.

The Lymphatic Vessels of the Vulva.—The lymphatic vessels of the vulva pass from either side of the vulva to the superficial inguinal group of glands.

The Lymphatic Vessels of the Vagina.—The lymphatic vessels from the lower part of the vagina pass to the superficial inguinal glands.

The lymphatic vessels from the upper part of the vagina pass to the internal and external iliac glands, and some from the posterior wall to the rectal glands.

The Lymphatic Vessels of the Uterus.—The lymphatic vessels from the cervix and the lower part of the body pass mostly to the internal iliac group. Some pass to the external iliac glands, and some pass to the sacral and rectal glands.

The lymphatic vessels from the body of the uterus pass mostly along the upper part of the broad ligament to the region of the ovary, with whose vessels they run to the lumbar glands. Some pass to the external iliac glands (see Fig. 18).

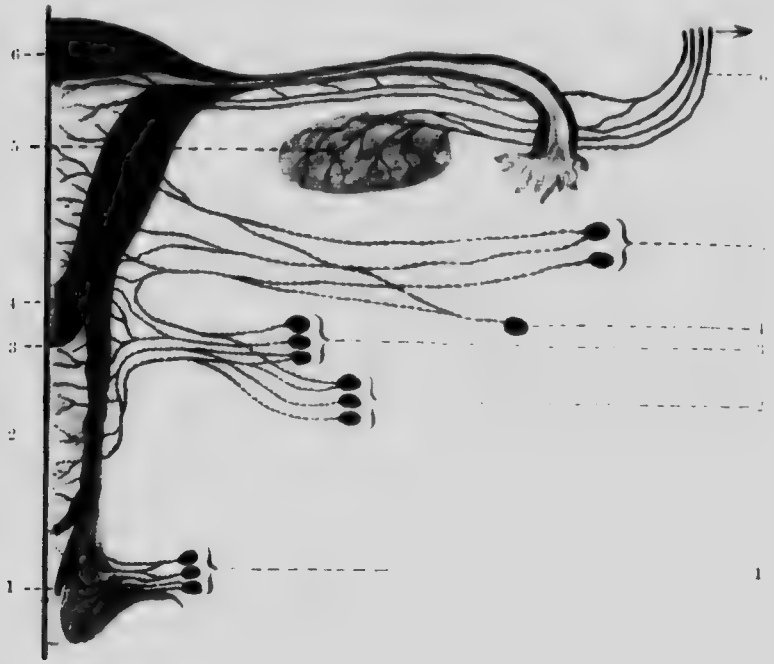


FIG. 19. LYMPHATICS OF THE PELVIS.

1, Lymphatic vessels from vulva and lower part of vagina passing to inguinal glands; 2 and 3, from upper part of vagina and cervix to internal and external iliac glands; 4, from cervix passing to uterine gland and on to internal iliac glands; 5, some from lower part of body of uterus to iliac glands; 6, from body of uterus, ovary, and Fallopian tube to lumbar glands.

The Lymphatic Vessels of the Ovaries.—The lymphatic vessels of the ovaries pass with the ovarian vessels along the upper part of the broad ligament, the infundibulo-pelvic fold, out of the pelvis to the lumbar glands.

The Lymphatic Vessels of the Rectum.—Those lymphatics which follow the course of the middle hæmorrhoidal vessels pass to the internal iliac glands.

Those lymphatics which follow the course of the superior hæmorrhoidal vessels pass to the rectal, sacral, and inferior mesenteric glands.

CHAPTER III

THE ANATOMY OF THE PELVIC FLOOR

The pelvic outlet is closed by the pelvic floor, which is found to consist of a number of layers of tissue which, beginning from within outwards, are met with in the following order (Figs. 20, 21):

1. Pelvic peritoneum.
2. Subperitoneal tissue.
3. Inner layer of pelvic fascia or deep layer of triangular ligament.
4. Levator ani and coccygeus muscles.
5. Outer layer of pelvic fascia or superficial layer of triangular ligament.
6. Superficial perineal muscles.
7. Perineal fascia.
8. Subcutaneous tissue.
9. Skin of perineum, vulva, etc.

The most important of these are the levatores ani and the fascial coverings on their surfaces.

Levator Ani Muscle.—The levatores ani muscles are two muscles situated one on either side of the middle line. They take origin from the lateral walls of the pelvis, and are inserted in the middle line, where each meets its fellow of the opposite side. Together they constitute the greater part of the pelvic diaphragm, which has a convex lower or perineal surface and a concave upper or intrapelvic surface.

The diaphragm is completed in its posterior and lateral portions by the coccygeus and pyriformis muscles. The levator ani has a triple origin, and arises anteriorly from the posterior surface of the os pubis, between the attachments of the parietal and visceral layers of the pelvic fascia. Posteriorly it arises from the pelvic surface of the spine of the ischium, whilst the intermediate fibres arise in the angle between the parietal and visceral layers of the pelvic fascia.

The fibres of the muscle pass downwards and backwards, and are inserted into—

1. The central point of the perineum.
2. The angle between the posterior wall of the rectum and the upper end of the anal passage, between the two sphincters which embrace it.
3. The median raphe behind the rectum.
4. The side of the lower part of the coccyx.

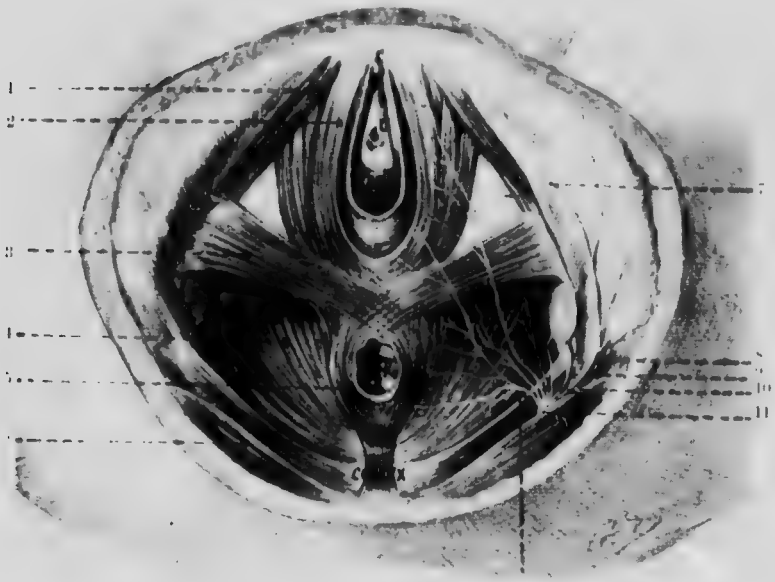


FIG. 20. - PELVIC FLOOR FROM BELOW.

1, Ischio-cavernosus; 2, bulbo-cavernosus; 3, transversus perinei; 4, levator ani; 5, sphincter ani; 6, gluteus maximus; 7, inferior pudendal branches of small sciatic nerve; 8, small sciatic; 9, external superficial perineal; 10, internal superficial perineal; 11, superficial branch of pubic; 12, inferior haemorrhoidal nerves.

The fibres of the muscles support the infero-lateral surfaces of the bladder and the lateral walls of the rectum. The anterior borders embrace the lateral borders of the vagina, and on contraction they exert a definite sphincter action.

A careful study of the muscle as a whole shows that it is divisible into four parts—the pubo-rectalis, the pubo-coccygeus, the ilio-coccygeus, and the ischio-coccygeus; and these names indicate the insertions and attachments of the various portions. They represent the flexor caudæ of tailed animals.

Actions of the Muscle.—1. The chief action is in defæcation, the muscle in its contraction drawing the wall of the anal canal upwards

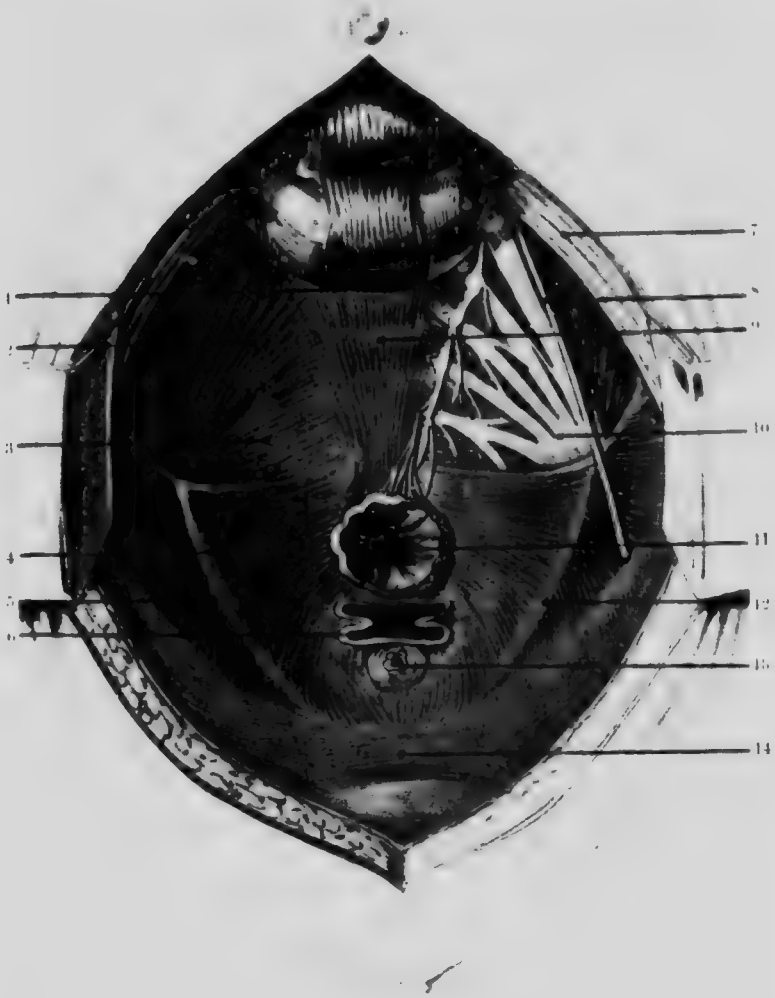


Fig. 21.—Pelvic Floor from Above: Viscera removed.

1, Promontory; 2, pyriformis; 3, coccygeus; 4, levator ani; 5, obturator internus; 6, vagina; 7, psoas magnus; 8, obturator nerve; 9, sacrum; 10, sacral plexus; 11, rectum; 12, white line; 13, urethra; 14, bladder.

over the fæcal mass. It also acts as a sphincter of the rectum, closing the anal passage.

2. The anterior edges of the muscles during contraction serve to

approximate the lateral walls of the vagina, and so compress its lumen.

3. It elevates the pelvic viscera upwards and forwards towards the symphysis pubis.

4. During parturition it helps to draw the pelvic floor upwards, and so aids in the delivery of the child.

Nerve-Supply.—1. On the pelvic surface by branches from the third and fourth sacral nerves.

2. Perineal branch of the pudendal nerve.

Coccygeus Muscle.—This arises from the pelvic surface of the ischial spine and the lesser sacro-sciatic or sacro-spinous ligament. It is inserted into the sides of the lower two sacral and upper two coccygeal vertebræ.

Its anterior margin is in contact with, and at times partly overlaps, the posterior border of the levator ani. Posteriorly it is separated from the pyriformis by the sciatic and pudic vessels and nerves as they leave the pelvic cavity.

It is enclosed in pelvic fascia.

Nerve-Supply.—From the third and fourth sacral nerves.

The pelvic surface of the muscles is clothed by the visceral layer of pelvic fascia. The perineal surface of the levator ani is covered by anal fascia. The remaining structures have been described in detail elsewhere.

The Pelvic Peritoneum.—That part of the general peritoneum which lines the pelvis is known as the pelvic peritoneum. It is a continuation of the membrane which lines the cavity of the abdomen, and it reaches the pelvis by passing in through its superior aperture. It covers the walls of the pelvis down to the floor, and proceeds thence to invest the various viscera that are contained in that cavity.

Posteriorly it completely invests the pelvic colon as low down as the third sacral vertebra, and forms for it a mesentery which is known as the pelvic mesocolon. Below the third sacral vertebra the rectum proper begins, and this portion of bowel is not completely covered by peritoneum, which here passes on to the posterior vaginal wall and covers its upper third. Thence it sweeps upwards over the posterior surface and the fundus of the uterus on to its anterior surface, which it covers as far as the junction of the body and cervix. At this level it passes on to the bladder, forming the utero-vesical fold or anterior ligament of the uterus. Then, having partly covered the bladder, it is continued upwards on to the deep aspect of the anterior abdominal wall.

The peritoneum is carried off from the margins of the lateral borders of the uterus to the side-walls of the pelvis, with the result

that there is created on either side of the uterus a double fold of peritoneum known as the broad ligament, or ligamentum latum uteri. The plane in which these structures lie is largely determined by the position of the uterus. In the position of anteversion each ligament has two surfaces, an antero-inferior and a postero-superior, of which the latter extends much lower than the former.

Fig. 22.—Sagittal Section of the Broad Ligament.

1, Fallopian tube; 2, mesosalpinx containing parovarium; 3, ovary; 4, ovarian vessels; 5, round ligament; 6, mesovarium; 7, uterine veins; 8, ureter, running through base of broad ligament; 9, uterine artery.

The Fallopian tube runs in the upper free edge of the broad ligament. The part that lies above the ovary and suspends the tube is known as the mesosalpinx, and between its layers are to be seen the epoöphoron and the paroöphoron. The part below the level of the ovary is known as the mesometrium, and contains a considerable amount of connective tissue, which is known as the parametrium. It also contains some unstriped muscle fibres, and that portion which lies in the lower part of the broad ligament, immediately below the uterine artery, is known as the lateral cervical ligament of the uterus, and is attached to the cervix uteri (Fig. 22).

The ovary is connected with the posterior layer by a short mesentery known as the mesovarium, by means of which the ovarian vessels and nerves reach its hilum. Laterally the upper part of the broad ligament, which contains the Fallopian tube, lies free in the abdominal cavity, whereas the lower part is attached to the lateral pelvic wall. The upper piece of this attached portion is known as the suspensory ligament of the ovary, or the ligamentum suspensorium ovarii, and in it the ovarian vessels and nerves enter or leave the pelvis.

The ligament of the ovary, or the ligamentum ovarii proprium, lies in a fold derived from the posterior layer of the broad ligament. It is about 1 inch in length, and is attached by its mesial end to the uterus immediately below and posterior to the entrance of the Fallopian tube, and by its lateral end to the uterine pole of the ovary.

The round ligament of the uterus, or the ligamentum teres uteri, is attached to the anterior aspect of the uterus, just below the opening of the Fallopian tube. It represents the lower portion of the gubernaculum testis of the male embryo, and lies in the anterior part of the broad ligament, in which it passes to the pelvic wall. It then turns forwards to cross the obliterated umbilical artery and the brim of the pelvis. Thence it travels through the inguinal canal, to end in the subcutaneous tissue of the labium majus.

As the result of the way in which the peritoneum invests the pelvic viscera, it comes about that a cavity lined by peritoneum is formed between the rectum behind and the uterus and vagina in front. It is known as the pouch of Douglas or the recto-uterine pouch, and its upper aspect is limited laterally by the utero-sacral folds of peritoneum which contain the utero-sacral ligaments, and pass from the cervix backwards on each side of the rectum to the front of the second piece of the sacrum, where they blend with the connective tissue in that neighbourhood. In front of the uterus a more shallow pouch is formed between it and the bladder, and this is known as the utero-vesical pouch.

In thin women, when the bladder is completely empty, a depression can be made out on either side of it, between it and the lateral pelvic wall. These are known as paravesical fossæ. Similarly, on either side of the empty rectum a much more obvious depression is to be seen between that structure and the lateral pelvic wall. These are known as the pararectal fossæ. These fossæ are obliterated when the organs become distended.

The Pelvic Fascia and Cellular Tissue.—External to the pelvic peritoneum there lies a loose tissue which is known as the pelvic

cellular tissue. It is continuous above with the extraperitoneal tissue of the general abdominal cavity, and is a very important structure in the pelvis, in that it fills up the spaces between the pelvic viscera which lie under the peritoneum and their supporting structures in a manner comparable to the sawdust in a packing-case. It serves a useful purpose in that it permits of ready distension of certain of the pelvic viscera, and it increases considerably in amount during pregnancy. The iliac vessels, lymphatics, nerves, and ureters, run in it beneath the peritoneum. The lower part of the rectum as far as the anal canal is completely invested by it. The lower part of the bladder—viz., that part that is uncovered by peritoneum—lies in a bed of it, and it extends around the anterior surface to lie in relation to the pelvic surface of the symphysis pubis. It fills the space between the layers of the broad ligaments to the lateral pelvic walls, and connects the anterior surface of the supra-vaginal portion of the cervix and upper part of the vagina to the bladder. The pelvic fascia is continuous with the pelvic cellular tissue, and is best considered as a specialized portion of it. It is a continuous structure which in certain areas is very dense, whereas it is not so strong in others. It is best for the sake of clearness to describe various portions of the pelvic fascia separately as different names are applied to the different areas of the fascia that are in relation to the different muscles; but it should be clearly understood that it is a continuous structure which closely invests the muscles lining the pelvis, and at the same time processes are sent out which act as supports to the various viscera and separate the pelvic cavity from the peritoneum. Two main portions are described:

(*a*) A parietal portion.
(*b*) A visceral portion.

The parietal portion is continuous at the pelvic brim with the fascia over the iliacus and psoas muscles. It descends into the pelvis, covering the obturator internus muscle, and this portion is therefore spoken of as the obturator fascia. From the cavity of the pelvis it can be traced downwards to a thickened white portion which runs from the lower part of the back of the body of the symphysis to the pelvic surface of the ischial spine. This line is known as the "white line," and from it the visceral layer of pelvic fascia originates; and immediately below this the levator ani muscle has its lateral origin. The parietal layer lining the obturator muscle is thus divided into two portions—an upper, which lines a portion of the lateral pelvic wall; and a lower, which forms the lateral wall of the ischio-rectal fossa.

The upper part of the parietal fascia passes backwards round the outer side of the internal iliac vessels, behind the root of the pelvic mesocolon, behind the rectum, in front of the sacrum, to be continued on the opposite side of the pelvis. Anteriorly there are no muscles on the pelvic surface of the pubic bones, and here it blends with the peritoneum on the back of the ascending pubic ramus, forms a thickened border which crosses the upper part of the obturator foramen, and then blends with the periosteum on the back of the body of the pubis, below the attachment of the visceral layer.

The lower part of the parietal layer of pelvic fascia forms the outer wall of the ischio-rectal fossa. It is attached inferiorly to the base of the triangular ligament, to the ischial rami and the lower edge of the sacro-sciatic ligament.

In the anterior part of the perineum the parietal fascia passes inwards from the margin of the pubic arch as the posterior layer of the triangular ligament, and blends with its opposite fellow in the middle line, embracing the urethra and also becoming continuous with the fascia on the pelvic surface of the levator ani, which will subsequently be described as the visceral layer of the pelvic fascia.

The perineal surface of the levator ani is covered by a thin layer known as the anal fascia.

The visceral layer of pelvic fascia projects from the parietal layer along the line already described as the "white line." It has a definite free border, and passes into the pelvic cavity, and serves to cover the pelvic surface of the levator ani muscle. It meets its fellow of the opposite side in the middle line, and in the posterior part of the pelvis the rectum sinks into it; farther forward it is carried over the upper part of the vagina on to the uterus, and farther forward still it passes up on to the sides of the bladder. In front of the bladder it is carried across to the opposite side, and in this portion of it two thickened bands—the anterior true ligaments of the bladder—attach that structure to the posterior surface of the symphysis pubis. Around the anterior borders of the levatores ani it passes and blends with the posterior layer of the triangular ligament, which, as has been previously explained, is formed by the parietal pelvic fascia. As the visceral layer approaches the middle line it splits into three layers:

(*a*) *The vesical*, which passes on to the bladder, and in front of the vagina and urethra.

(*b*) *The recto-vaginal*, which crosses between the rectum and vagina.

(*c*) *The rectal*, which passes behind the rectum.

CHAPTER IV

DEVELOPMENT OF THE UTERUS, VAGINA, AND VULVA

The terminal part of the primitive hind-gut becomes expanded, and is then known as the entodermal cloaca. The ventral aspect of the cloaca is continuous at its cephalic end with the allantoic diverticulum, which is primarily derived from the entodermal sac, but which comes to be eventually connected with the hind-gut. The dorsal aspect of the cloaca is continuous with the primitive gut.

By means of a septum which grows down from the angle between the allantoic diverticulum and the ventral wall of the cloaca to the cloacal membrane, the entodermal cloaca becomes separated into a ventral or urinogenital chamber, and a dorsal part—the primitive rectum.

About the fifteenth day there appear on the lateral aspect of the protovertebral somites two longitudinal ducts, which are known as the Wolffian ducts. They are the primary excretory ducts, and communicate above with the tubules of the pronephros and mesonephros. As these ducts pass towards the caudal end of the embryo, they approach one another, and come to lie in a fold of peritoneum known as the plica urinogenitalis. Traced still farther caudally, they approximate closely to one another, and are found to lie in a mass of connective tissue known as the genital cord. They eventually open on either side of the ventral aspect of the cloaca in the urinogenital chamber. In the female the Wolffian ducts disappear to a very large extent, but the longitudinal duct of the epoöphoron or the duct of Gärtner, and the appendices vesiculosi or the hydatids of Morgagni, are rudimentary structures which have their origin in them. The appearance of the Wolffian ducts is shortly followed by that of two other longitudinally disposed ducts which are known as the Müllerian ducts. They appear on the lateral aspects of the former, and their cephalic ends open into the primitive body cavity. As they pass towards the caudal end of the embryo, they cross the Wolffian ducts and unite in the median plane in the substance of the

genital cord, and open into the urinogenital part of the cloaca between the openings of the Wolffian ducts. It is from these Müllerian ducts that the Fallopian or uterine tubes, the uterus, and the vagina, are developed.

On the ventral aspect of the cloaca, along the line of the primitive streak, the ectoderm thickens and invaginates, to form a depression known as the ectodermal cloacal fossa, or proctodæum. In the floor of this perineal depression, ectoderm and endoderm come into contact, and the so-called cloacal membrane is formed. This membrane breaks down comparatively early, and so communication is

Fig. 23.

Fig. 24.

FIGS. 23 AND 24.—DIAGRAM SHOWING FEMALE GENERATIVE ORGANS DEVELOPING FROM A COMMON TYPE. (After Allen Thomson.)

B, Bladder; *I*, intestine; *U*, ureter; *O*, ovaries; *M*, Müllerian ducts; *F*, Fallopian tube; *UT*, uterus; *V*, vagina; *w*, Wolffian ducts; *W*, Wolffian body; *L*, labium; *N*, nympha; *v*, vulva; *X*, elevation which will become clitoris or penis; *Z*, fold of integument which will become labium majus or scrotum.

established with the surface, first by the dorsal portion of the cloaca or primitive rectum, and a little later by the urinogenital canal, through an aperture which is more anteriorly situated. At this stage, then, the urinogenital canal or sinus serves as a common channel for the bladder, Wolffian and Müllerian ducts, and opens in the perineal depression, but this arrangement is considerably modified a little later.

The portions of the Müllerian ducts which lie in the Wolffian ridge, and which are suspended by the Wolffian mesentery, become the Fallopian tubes. The pelvic portions of these ducts—*i.e.*, the portions within the genital cord—fuse and form the uterus and vagina.

The process of fusion begins about the third month, and the septum produced by the union of the mesial walls begins to disappear first

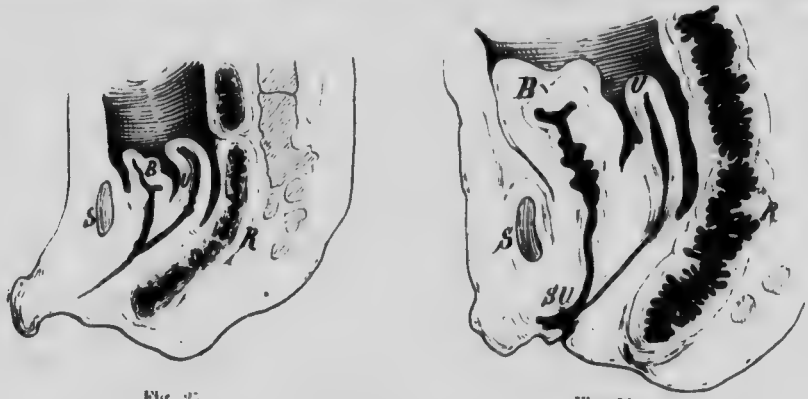


Fig. 25. Fig. 26.

FIGS. 25 AND 26.—DEVELOPMENT OF FEMALE GENITAL ORGANS.

B, Bladder; *R*, rectum; *S*, symphysis; *U*, uterus; *SU*, sinus urinogenitalis.

Fig. 25: Section through a human female fœtus at about fourth month, showing the urinogenital sinus which has not yet established connection with the surface.
Fig. 26: Section through a human female fœtus at about fifth month.

FIG. 27.—SECTION THROUGH A HUMAN FEMALE FŒTUS, AT A LATER STAGE WHEN THE DEVELOPMENT IS COMPLETED.

B, Bladder; *U*, uterus; *V*, vagina; *S*, symphysis; *R*, rectum; *FT*, Fallopian tube.

below the portion that ultimately becomes the cervix uteri. Then the cervical part disappears, and finally the upper part of the septum.

Towards the middle of the third month the tissue in the lower end of the genital cord begins to proliferate rapidly, and pushes down the urinogenital sinus. At the same time from the epithelial lining of the Müllerian ducts, solid cords of epithelium also grow downwards towards the urinogenital fissure. These cords fuse together and form a solid block, which eventually becomes canalized and forms the vagina, and this communicates with the urinogenital fissure by a third opening which lies between the orifices of the urinogenital

FIGS. 28 AND 29.—DEVELOPMENT OF EXTERNAL GENITAL ORGANS.

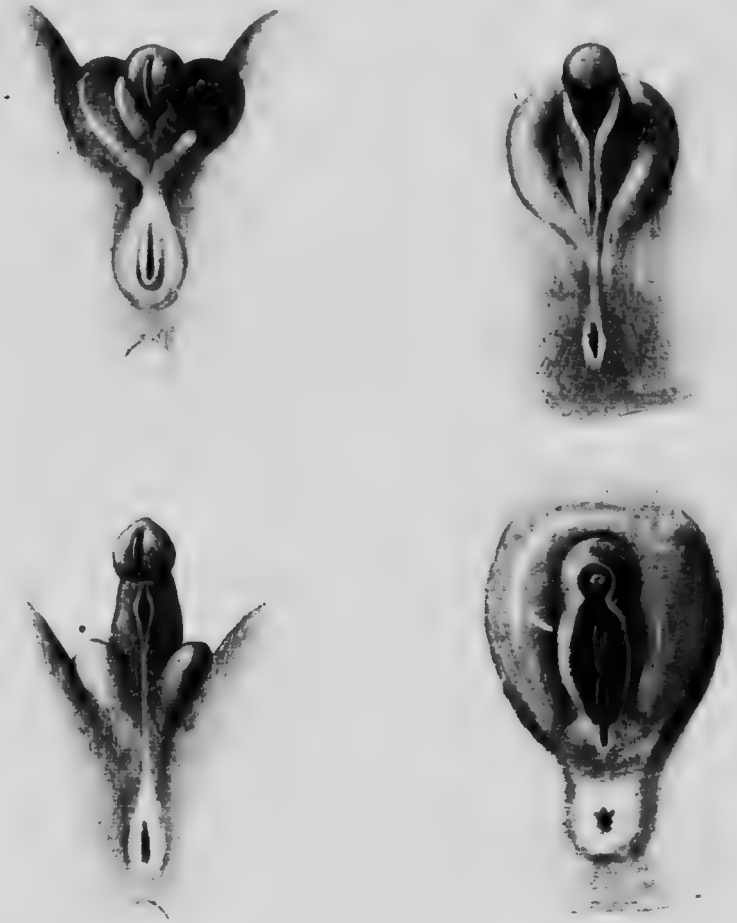
I., Embryo of 20 mm.; *II.*, embryo of 30 mm.

Figs. 28 and 29 show the external genital organs of the human embryo at an early date. Fig. 28 is from an embryo of 20 mm. Fig. 29 is from an embryo of 30 mm. There is no definite indication of sex yet present, but the labio-scrotal folds and the genital eminence are shown.

sinus and the primitive rectum. As the result of these processes the urinogenital sinus becomes opened out and shortened, and forms the urethra and the floor of the pudendal cleft from the fossa navicularis to the glans clitoridis. At the point where the fused Müllerian ducts open into the urinogenital fissure a slight fold appears at the margin, and this eventually becomes the hymen.

At the ventral limit of the ectodermal cloacal fossa a tubercle appears, which is known as the cloacal tubercle. This later gives rise to the genital eminence whose apex becomes the glans clitoridis,

and to a pair of lateral folds known as the labio-scrotal or outer genital folds, which form the labia majora. The margins of the opening of the urinogenital sinus become elongated and form the



Figs. 30 and 31. Figs. 32 and 33.

FIGS. 30 TO 33.—DEVELOPMENT OF EXTERNAL GENITAL ORGANS.

Figs. 30 and 31 show two stages in the development of the male external genital organs. Figs. 32 and 33 show two stages in the development of the female external genital organs.

inner genital folds, which eventually become the labia minora. These folds divide in front, their inner divisions going to the frænum of the prepuce, and the lateral divisions passing to form the prepuce itself (Figs. 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33).

CHAPTER V

OVARIAN SECRETION

Until comparatively recent years it was supposed that the ovaries had but one function, and were concerned only in the process of reproduction.

Experimental research, which has dealt chiefly with the phenomena attending their removal and transplantation, and clinical observations, have, however, brought forward evidence to show that they are intimately connected with the physiological and pathological processes of the body as a whole. Their removal is not only attended by sterility, but by other changes in the distant organs of the body, which changes can be inhibited for a time by the transplantation of ovarian tissue elsewhere.

Observers are not in entire accord as to the effects of the experimental or operative removal of the ovaries, but the evidence points to the fact that the removal of one ovary is not followed by any marked physiological or pathological effect, but that a compensatory hypertrophy occurs in the remaining organ. At the same time clinical evidence goes to show that a definite mental effect may follow.

The results of the removal of both ovaries vary according to whether sexual maturity has been attained or not. In the latter case an arrest in the development of the genital organs and mammiæ occurs, the onset of menstruation is prevented, and the secondary sexual characters of the woman do not appear. At times the ossification of the long bones is interfered with, but as a rule there is no marked effect on the general nutrition. If sexual maturity has been previously attained, cessation of the menses together with atrophy of the genitalia and glandular tissue of the breasts follow. In a certain proportion of cases the phenomena characteristic of the menopause ensue, and there is an increased deposit of fat all over the body. A subsequent transplantation of ovarian tissue will temporarily prevent the atrophy of the genitalia and the cessation of menstruation. If both ovaries are removed during a pregnancy, abortion does not necessarily occur.

PUBERTY.

The changes which take place at puberty afford definite clinical evidence of the importance of the influence exerted by the ovaries on the development of the individual. At puberty the secondary sexual characters of the female appear, and are demonstrated by the onset of menstruation, the increased growth of the genital organs, the appearance of hair in the axillæ and on the pubes, the rounding of the body curves, enlargement of the mammæ, and certain psychic manifestations. It is interesting to bear in mind that at this time enlargement of some of the other ductless glands also—*e.g.*, the thyroid and pituitary—takes place. Again, following the atrophy of the ovaries that occurs at the menopause, menstruation ceases, the uterus and mammæ undergo atrophic changes, and various vascular and nervous phenomena ensue.

An explanation of these phenomena is presented in the supposition that, in common with the other ductless glands, the ovaries produce an internal secretion whose nature and composition are as yet almost entirely unknown, but which contains a hormone or hormones which exert a very definite influence on the nutrition of the mammæ and generative organs. In dealing with this problem, the greatest difficulty is encountered in the attempt to separate the various physiological functions of the several organs of the body that produce an internal secretion, and to apportion its absolute value to each, as they appear to be able readily to assume one another's functions to a great extent.

A study of the minute structure of the ovary shows it to be a complex body which consists essentially of three chief tissues—the corpus luteum, the Graafian follicle, and interstitial cells. The attempt to assign to each of them its particular rôle in the production of the internal secretion is also beset with difficulties. It has been suggested that the corpus luteum exercises a considerable control over the process of the embedding and nutrition of the ovum, but it is not true that in early pregnancy abortion necessarily takes place if this structure is destroyed.

The interstitial cells increase in size during menstruation and pregnancy, and atrophy after the menopause; but it is not known if they of themselves exercise a definite secretory function.

It is assumed by some observers that the internal secretion of the ovary is of an elaborate nature, that each of the constituent parts of the ovary supplies its own peculiar portion of this secretion, and that the actions of these several portions are mutually antagonistic. While this is undoubtedly a fascinating theory, it must at

present be admitted that our knowledge is not yet sufficiently advanced to place much credence in these suppositions, and they cannot yet be said to be definitely established.

THE MENOPAUSE.

The menopause, the climacteric, or the "change of life," are synonymous terms applied to that time in a woman's life when cessation of menstruation, associated with various other phenomena, takes place. The average time of its occurrence is between the ages of forty-five and fifty, although individual cases occur as early as thirty or later than fifty. The features presented by its onset vary greatly in different people, and our state of knowledge is not yet sufficiently advanced to anticipate with any accuracy the type that will be followed by any given individual.

In some women there is little or no manifest disturbance, whilst in others there is a profound change. The alteration of the menstrual cycle is frequently the first thing to attract the attention of the woman. Usually the menses appear at longer intervals, and the amount of blood lost lessens in amount until cessation finally takes place, but sometimes the cessation is abrupt.

At times the loss may be profuse. While it is perfectly true that floodings may occur without any obvious lesion of the pelvic organs, especially after periods of amenorrhœa, patients so affected should always be carefully examined, owing to the prevalence of malignant disease of the uterus at this period of life. The essential for the successful treatment of this condition is its early recognition, and it therefore can be most emphatically stated that, in the present state of our knowledge, there is no way of detecting early malignant disease of the uterus other than by a careful vaginal examination of the cervix, by exploration of the uterine cavity if the cervix is normal, and by a microscopic examination of any doubtful tissue.

The cessation of menstruation is accompanied by definite changes in the pelvic organs, which show a gradual atrophy. The ovaries diminish very considerably in size. Their surfaces become wrinkled and irregular, the Graafian follicles disappear, and microscopically little is to be made out but fibrous tissue. The body of the uterus diminishes in size; the cervix atrophies so that the vaginal portion almost entirely disappears. The muscle of the uterus is gradually replaced by fibrous tissue. The vagina atrophies, especially in its upper portion, and, instead of its widest part being uppermost, it becomes cone-shaped, with the apex at the external os. The labia majora

and the mons Veneris gradually atrophy, lose their hair, and expose the nymphæ. The vulval orifice is considerably narrowed. At the same time there is usually a distinct tendency towards obesity, although the breasts tend to lose their fat and shrink accordingly. The woman frequently complains of "hot flushes," experiencing a sensation of heat, often accompanied by sweating and followed by chilliness. These are due to some vasomotor disturbance. Various nervous phenomena frequently occur with attacks of giddiness, obscure pains or loss of power in various regions of the body. Indigestion is a frequent cause of complaint, and is accompanied by flatulence and constipation. The mental condition of the individual is frequently very definitely affected, and all degrees, from a certain amount of irritability or depression to a condition closely allied to insanity, are to be observed.

As our knowledge of the internal secretions of the body and their effects improves, it appears increasingly probable that the explanation of these phenomena is to be found in a disturbance of the balance of these secretions. However, it is not yet possible to make definite statements in this connection.

Treatment.

The symptoms of the menopause as a rule gradually subside. They are, however, frequently sufficiently urgent to demand treatment, and the lack of any very definite knowledge necessitates that this should be palliative and symptomatic. The relief afforded by the administration of artificial extracts of the various ductless glands—*e.g.*, thyroid extract and some of the ovarian and testicular extracts—is so very variable that it is at present unwise to expect too much in any individual case. On the other hand, the result is at times so beneficial that one is justified in assuming that this method of treatment has great possibilities.

If the symptoms are due to an increased blood-pressure, the administration of potassium or sodium iodide is at times followed by some benefit.

The nervous symptoms of the menopause are often materially alleviated by the internal administration of bromides. If the drug is given in 10-grain doses three times a day for not longer than a fortnight at a time, it will not produce a depressing effect. Ichthyol in the form of a 2½-grain pill, or one-half to a drachm of the ammoniated tincture of valerian, may often be usefully administered.

Irregularities in the actions of the bowels demand suitable treatment.

SECTION II.—METHODS OF INVESTIGATION

CHAPTER VI

HISTORY, EXAMINATION, AND INSTRUMENTS

HISTORY.

For the purpose of arriving at a correct diagnosis, great care must be taken in eliciting the history of a patient. This history in conjunction with the physical signs should lead to a correct label being affixed to the disease, whereas with an incomplete history the diagnosis may be uncertain.

Case-taking must always be systematic, otherwise some important point bearing on the case may be forgotten. For this systematic note-taking a printed form somewhat on the following lines may be adopted:

Name and Address — Date

Age — Civil state (married, single, or widow)*

Occupation

1. ANAMNESIS.

History of Present Illness.—Nature of symptoms and their duration.

Confinements, Miscarriages, etc.—The number of confinements and miscarriages, nature of confinements, puerperal complications, with special reference in the latter to duration of lying-in, duration of red discharge, and whether the temperature was raised. Date of last confinement or miscarriage.

Menstrual History.—Date of onset, duration and rhythm of the period, quantity, the colour and the presence or absence of clots, and whether or not accompanied with pain. If pain is present, the time and character of the pain. Date of last period or of menopause. Discharges other than the menstrual discharge. The colour, whether clear, opaque, purulent, or hæmorrhagic, and whether offensive.

* This question is best asked after inquiring about confinements.

Defæcation and Micturition.—If micturition is frequent, whether the frequency is diurnal or nocturnal. If there are any disorders of digestion or vomiting, and any loss of flesh.

General Health.

Previous Illnesses, with reference chiefly to attacks of abdominal or pelvic pain confining the patient to bed, or other serious disorders.

Family History.—Tuberculosis, syphilis, etc.

2.—Present Condition.

General appearance.
Teeth and tongue.
Heart, lungs, nervous and other systems.
Br
[illegible]
[illegible]a and perineum.
[illegible]gina and urethra.
[illegible]rus and adnexa.
Urine.

3.—Treatment and After-History.

The accurate taking of the history of a patient requires much more than the mere asking of a few leading questions. It should be impressed on the student that he must not lose sight of the fact that what may seem to him merely everyday questions may to the patient appear very delicate ground. This is especially the case in those who are unmarried. It is very necessary to gain the confidence of the patient early in an interview, otherwise information which may be of the greatest importance may be withheld. Questions in regard to sexual intercourse need only be asked when the patient seeks advice for dyspareunia or sterility.

In trying to ascertain the cause of the present illness, it may be necessary to search far back in the history, to some fever following childbirth or miscarriage, or some infection and discharge originating soon after marriage.

The menstrual history must be carefully taken. The term "period" should be carefully used, and only employed to designate a rhythmic and regular discharge of blood, and not an irregular and inconstant blood-discharge. Whether the duration, frequency, or quality, of the period has changed since the present illness

began, the quality of the discharge meaning whether the menstrual fluid contains clots or is excessive in amount. The average period may be taken as lasting about five days, and recurring every twenty-eight days. Generally about a dozen diapers are used at the period.

Having obtained as full and accurate a history as possible, it is necessary to examine the patient.

ABDOMINAL EXAMINATION.

After the patient has loosened her clothes and removed her corsets, she should lie flat on a couch, and if the abdomen is at all rigid she should lie with her knees drawn up to relax the abdominal muscles.

Inspection.—The abdomen should be looked at in a good light, and its size and shape noted; whether there is fulness in the hypogastric region or in either flank; the condition of the skin, whether scarred by lineæ albicantes (denoting either a previous pregnancy, abdominal distension from some other cause or rapid deposition of fat), the presence or absence of rashes, pigmentation, etc. Distension of the bowel may be noticed, and in thin subjects the large intestine can be seen, especially the transverse colon, with waves of peristalsis running along it.

Palpation.—The abdomen must now be palpated systematically. The three great adjuncts to a successful examination are thoroughness, gentleness, and warm hands. If there is reason to believe that one part of the abdomen is more tender than another, let that part of the abdomen be examined last, so as to gain the confidence of the patient and thus allow more manipulation than if that part had been touched first.

Palpation must not be practised with the tips of the fingers, but with the whole of the flat of the hand, as then deeper palpation can be made without hurting the patient. Some patients cannot relax the abdominal muscles though every artifice may be employed, but sometimes by superimposing the two hands and pressing firmly with the upper hand information may be gained which could not have been gained with the single hand, as the pressure necessary to overcome the resistance would have deprived the hand of its sense of touch.

If abdominal rigidity is encountered, it must be determined whether the rigidity is due to nervousness or to true rigidity of the abdominal muscles guarding some underlying tender spot. If the [illegible] be overcome

by making the patient breathe deeply with the mouth open or by engaging her in conversation. If the rigidity is due to underlying disease, the abdominal muscles will not relax and move when the patient takes a deep breath. Palpation enables one to say whether a swelling felt is solid or cystic, and, further, whether the consistence of a solid swelling is hard, soft, or elastic. If palpation suggests the presence of free fluid in the peritoneal cavity, it is necessary to dip down by a sudden but gentle movement of the fingers, in order to feel if there is any solid growth lying at a lower level. Abdominal palpation must include examination of the whole abdomen, not only the pelvic area.

Percussion.—This enables one to decide whether a swelling is dull on percussion and in contact with the abdominal wall, or whether bowel intervenes between the tumour and the abdominal wall. By the distribution of the area of dullness over the abdomen, and by the fact that the dullness shifts with different positions of the patient, the presence of free fluid in the peritoneal cavity may be diagnosed. Dullness in the flanks is nearly always associated with free fluid in the peritoneum. A cystic swelling with thin fluid contents will give a fluid wave or thrill on percussion.

Auscultation.—This is very valuable in the differential diagnosis of a tumour from a pregnant uterus. In the former, with the exception of a large soft myoma, the auscultatory signs are negative. In the latter and some soft myomata there will be heard the blowing sound called the "souffle," synchronous with the patient's heart-beat, and in the case of the pregnant uterus, after about the twentieth week, there may in addition be heard the fœtal heart.

VAGINAL EXAMINATION.

The objects of a vaginal examination are—

1. The inspection of the vulva.
2. The examination of the vagina and vaginal cervix.
3. Bimanual examination of the pelvic organs.

There are three positions commonly used for gynæcological examinations—viz.: (*a*) lithotomy; (*b*) semi-prone; (*c*) dorsal. Each position has its advantages and disadvantages.

Lithotomy Position. — If the examination is made under an anæsthetic, the best position is the lithotomy position. The patient lies on her back, with the buttocks drawn to the edge of the table and the thighs flexed on the abdomen, and kept in position with a Clover's crutch or other support.

Without an anæsthetic the examination must be made with as little exposure of the patient as possible. Patients, at any rate in private practice, object to examination in the lithotomy position.

Semi-prone Position.—The semi-prone position, or Sims' position, in which the patient lies on the left side with the left arm behind her, and the right knee drawn up slightly more than the left, gives a very good view of the external genitals. This position is also very convenient for an examination of the vagina, either with the finger or with the speculum.

Dorsal Position.—The dorsal position, with the patient lying on a couch on her back with the knees flexed, does not afford a view of the vulva without exposure to an undue amount, and does not permit the easy introduction of a speculum, but is often the most convenient position for bimanual examination.

Method of Examining.—The examination should be made in a methodical manner, and the various parts examined in order. First the presence or absence of a vaginal discharge should be noticed, the labia and clitoris inspected for ulcerations, new growths, or swellings. When the external genitals have been examined, the labia should be separated and the urethral orifice examined for growths, and the urethra compressed from behind forwards to establish the presence or absence of a purulent urethral discharge. The hymen and the orifices of Bartholin's ducts should be inspected. Next, with the index finger of the right hand well lubricated, and guarded with a rubber finger-stall or glove, an exploration should be made of the vaginal canal. The walls should first be examined, and the smoothness, laxity, and degree of moisture noted. A growth or cyst of the vaginal wall, or a long-forgotten pessary, may be discovered. Exploring farther, the fornices are examined, and it is noted whether they are obliterated or made to bulge by swellings outside the vagina. Cicatricial bands, generally of traumatic origin, may be found passing across the vault of the vagina. The vaginal cervix must next be examined. Its direction, size, and shape, must be noted. Its surface may be smooth or irregular and dotted with mucous retention cysts (ovula Nabothi), or it may be soft and covered with granulations (the so-called "erosion"). The external os may be small and nulliparous or large and patulous, admitting the tip of the finger. This dilatation does not as a rule extend to the internal os, unless there is something inside the uterus which this organ is trying to extrude. The cervix may be torn on either one or both sides, and the lips of the cervix may be far apart and everted. The cervix may be rough and the seat of a malignant growth, or there may be a

soft mucous polypus growing from it, or it may be the seat of a solid growth, such as a fibroid. Occasionally the cervix can only be reached with difficulty, as when it is pushed out of the pelvis by a tumour occupying the pouch of Douglas, or when there is an incarcerated retroverted gravid uterus.

Bimanual Examination.—The bimanual examination should next be made. This examination is made with the purpose of finding out the size, position, and consistence of the uterus and the condition of the ovaries and Fallopian tubes. With the patient now lying on her back and her knees drawn up, a second finger may be introduced into the vagina, though, if the vagina is either small or tender, it may still be wise to use only the index finger, as, if the second finger causes pain, the patient will unconsciously make tense her muscles, which will more than neutralize the advantage of the second finger. But if the vagina is capacious, the two fingers have a greater range of exploration, and should always be employed. The advantage of using only one finger at first enables the examiner to dilate the vagina to a certain extent and prepare it for the introduction of a second finger for the bimanual examination.

This bimanual examination is carried out with the two hands palpating together. The index and middle fingers, generally, of the right hand are well lubricated and introduced high into the vagina, the left hand being placed on the hypogastrium, and the pelvic organs are then palpated between them. The direction of the cervix is first noticed, and then the fingers of the right hand are moved into the anterior fornix, and by counterpressure of the left hand on the abdomen the fundus can be felt between the two hands in a position of anteflexion or anteversion, or, on the other hand, the absence of the fundus from the normal position is diagnosed. The fingers are now transferred to the posterior fornix, and in the absence of the fundus uteri from the normal position a swelling corresponding to the fundus may be felt in the pouch of Douglas, and a diagnosis of retroversion or retroflexion made. Sometimes, owing to the thickness or rigidity of the abdominal wall, it is impossible to define the uterus accurately. However, by a manœuvre sometimes called "weighing the uterus," performed by balancing the uterus on the examining fingers, it is possible to infer that the uterus is normal in size and position or otherwise.

Having diagnosed the position of the uterus, the examination of the Fallopian tubes and ovaries must next be proceeded with. With the patient lying on her back, and the examiner using his right fingers internally, the structures lying to the right of the uterus

will be the more easily felt. The uterus is pressed down by the left hand on the abdomen, and the junction of the Fallopian tubes with the uterus felt for, the former being then carefully examined by rolling them between the examining fingers. If the Fallopian tube is thickened, it may be readily felt, but if it is normal a thin and relaxed abdominal wall are necessary for its palpation. The internal fingers then feel for the right ovary against the pelvic wall. If normal it is rather elusive, as it slips away from the examining finger; but when felt it is a smooth, round, and mobile organ which is peculiarly sensitive to touch. A small swelling like the normal ovary may be most readily felt on the left side of the pelvis by the left fingers used internally.

Should a thickening or "mass" be felt in the pelvis, its size, consistence, mobility, and attachments, must be carefully noted. Especially must its attachment to the uterus or freedom from attachment to that organ be determined. This is effected by steadying the uterus by the fingers in the vagina, and pushing down or aside the mass with a hand on the abdomen, and noting whether the uterus is moved by this manœuvre. If the pelvic swelling moves with the uterus, it is either springing from the uterus or adherent to it. If free from the uterus, it probably arises from the Fallopian tube or ovary.

INSTRUMENTS.

The following are the instruments most commonly used in gynæcological examination: Specula (*e.g.*, Fergusson's, Sims', Cusco's); uterine sound; uterine probe; bladder sound; volsellum; sponge forceps; catheter.

To make a visual examination of the vagina, some form of speculum must be used. The most convenient forms of specula for general use are: (1) Tubular; (2) duckbill; (3) bivalve. These are all made of metal which is nickel-plated, and so give a good view and illumination of the vaginal canal.

FIG. 34.—TUBULAR SPECULUM (FERGUSSON).

Fergusson's Speculum.—This is in the form of a tube with the posterior lip longer than the anterior, and the vulval end flanged. It is made in sets of different sizes. It is more difficult to introduce, if the vagina is at all small, than the others mentioned, but when inserted gives a good view of the cervix and, during extraction, of the vaginal walls. Great care should be taken not to hurt the

patient while inserting it. It should be warmed and lubricated, the labia separated with the left hand, and the beak inserted and pressed firmly back towards the perineum until the speculum slips in easily without impinging on the sensitive vestibule (Fig. 34).

Sims' Speculum.—This instrument, which was devised to display vesico-vaginal fistulæ, consists of two concave blades of different sizes, with a handle connecting them. It is used with the patient in the semi-prone or Sims' position, and when the upper buttock is raised gives a fair view of the cervix and anterior vaginal wall. It requires holding all the time it is being used, and is more useful for gynæcological operations than in the consulting-room (Fig. 35).

Cusco's Speculum.—This consists of two blades fixed together at the vulval end by a hinge. It is a very useful form of speculum, as it is less painful to insert than a Fergusson's speculum and gives an excellent view of the vagina and cervix, and when screwed up remains steady in the vagina without being held. It needs more care in keeping clean than the other specula (Fig. 36).

Uterine Sound.—This instrument is made of flexible copper, nickel-plated and set in a handle. Its terminal 2½ inches are bent at an angle of about 135 degrees to the rest of the instrument, to facilitate its introduction into the uterine cavity. It is graduated in inches to measure the length of the uterine cavity. With the increase of skill in bimanual examination, the sound is not used so often as formerly, as there is always the risk of introducing organisms into the uterine cavity, and the possibility of perforating the uterus itself. It is very rarely necessary to pass the sound (Fig. 37).

When there are two or more swellings present in the pelvis, it may be impossible by bimanual examination without anæsthesia to determine which is the uterus, without the aid of the sound.

Precautions in the Use of the Uterine Sound.—Before passing the sound, the vagina and cervix should be swabbed, so that any discharge therein is not carried into the uterus. In modern gynæcology the sound is rarely used except under operation conditions and with the patient anæsthetized.

Method of passing the Sound.—The passage of the sound is not difficult. It is merely a matter of knowing in which direction to pass it. No force must be used in passing it, else the uterine wall may be perforated. If the body of the uterus is lying forwards, the sound is passed, with its concavity forwards, into the external os. By depressing the handle towards the perineum the point of the sound travels to the internal os, and then by further depressing the handle it passes into the uterine cavity, and the length of the cavity

is measured on the sound. The patient usually experiences a slight sickening sensation as the sound passes through the internal os. For retroversion and retroflexion of the uterus the sound should be passed as far as the internal os with its concavity forwards, then the handle of the sound should be made to describe a semicircle so that the concavity looks backwards, and the handle carried towards the symphysis pubis when the sound will enter the uterine cavity.

When the position of the uterus is unknown, the sound must be passed into the cervical canal,

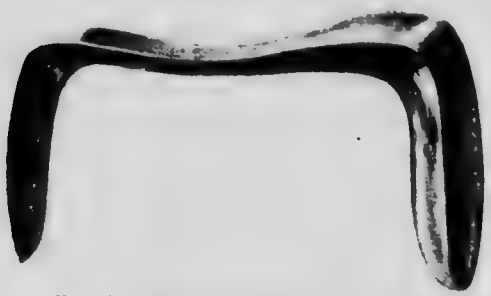


FIG. 35.—DUCKBILL SPECULUM (SIMS).

FIG. 36.—BIVALVE SPECULUM (CUSCO).

FIG. 37.—UTERINE SOUND, GRADUATED IN INCHES.

and then by manipulating it until it enters the uterus, the position of this organ will be indicated by the direction of the end of the instrument. The length of the cavity can also be noted.

Uses of the Uterine Sound.—The sound can be used—

1. To measure the length of the uterine cavity.
2. To diagnose the position of the uterus.
3. To replace a backwardly displaced uterus.
4. To diagnose the nature of a pelvic tumour.
5. To diagnose the nature of a tumour in the vagina.

To measure the length of the uterine cavity—(a) Uterus longer than normal.—The unimpregnated uterus is enlarged if the seat of fibroid tumours (except the subperitoneal variety), in prolapse and in hypertrophic elongation of the cervix, in subinvolution, corporeal polypi, chronic endometritis, adenomatous endometritis, adenomyoma of the uterus, and extra-uterine pregnancy.

(*b*) *Uterus smaller than normal.*—The uterus is smaller than normal when atrophied either as the result of the normal or induced menopause, or of superinvolution. The uterus may also be congenitally smaller than the normal.

To diagnose the position of the uterus.—The uterus is normally anteverted. It may be found by the sound to be anteflexed, retroverted, retroflexed, or lateriverted.

To replace a backwardly displaced uterus.—For the method of doing this see p. 161.

To diagnose the nature of a pelvic tumour.—If the tumour moves with the uterus when this organ is moved with the sound, it is probably uterine in origin, since if it was the Fallopian tube or ovary adherent to the uterus this organ would be fixed also. On the contrary, if the uterus moves apart from the tumour, the latter is probably not uterine in origin. Rarely a pedunculated subperitoneal fibroid will give this sign.

In some cases it is difficult, owing to rigidity of the abdominal muscles or to adipose tissue, to make a satisfactory bimanual examination. In such a case a tumour in the pouch of Douglas may be the body of the uterus.

If the sound passes forwards, and a tumour is felt in the pouch of Douglas, then obviously the tumour cannot be the body of the uterus.

To diagnose the nature of a vaginal tumour.—At times there may be some little difficulty in deciding whether a tumour protruding into the vagina is a polypus or an inverted uterus. In the case of a polypus growing from the body of the uterus, the uterine sound will enter farther than normal, unless, as occasionally happens, the

pedicle is adherent to the cervix: whilst if the tumour is an inverted uterus, the sound will enter less than the normal distance.

A suspicious-looking patch may at times be identified as a carcinoma, if the point of the sound can be made to penetrate it easily.

Contra-Indications to the Use of the Sound.—The sound should not be used if there is a septic vaginal or vulval discharge, if carcinoma of the body is suspected, in cases of pelvic inflammation, during menstruation, or if there is the least suspicion of pregnancy. Therefore it is most important to inquire the date of the last menstrual period, and also, as far as possible, to make sure by further examination that the physical signs coincide with the statements of the patient.

Uterine Probe.—A uterine probe is usually made of flexible metal, with the last 3 inches roughened to hold firmly a thin layer of wool. It is used for applying various medicaments to the cervical canal, or in some cases to the uterine cavity.

Volsellum.—A volsellum is a pair of toothed forceps which can be used to anchor or draw down the cervix.

Examination of Discharges.—If the patient is suffering from a purulent vaginal discharge, a smear must be taken for microscopical examination or for a culture to be grown. Examination should be made of the discharge squeezed from the urethra, and of the discharge taken directly from the cervical canal through a speculum. In the case of a chronic cervical discharge, it is of great value to squeeze the cervix with a pair of sponge forceps before collecting the material for a film. The examination of the discharge lying in the vagina itself is not of particular value, as it is always teeming with bacteria. In children it is necessary to examine all vulval discharges, and, in addition, any discharge which may cling to a probe introduced into the urethra. Occasionally in children it may be necessary to introduce an aural speculum through the hymen to obtain a specimen from the upper part of the vagina.

SECTION III.—SYMPTOMS ASSOCIATED WITH DISEASES OF THE GENITAL ORGANS

CHAPTER VII

AMENORRHŒA

AMENORRHŒA is said to be present when the usual periodic discharge of blood from the uterus (menses, catamenia) does not take place.

It is a *physiological* condition before the onset of puberty, which in this country is usual about the fourteenth year; during pregnancy; during lactation (in the majority of women); and after the menopause.

The menopause occurs at about the forty-seventh or forty-eighth year, but may be later in patients with fibroids and those in whom puberty occurred earlier than usual.

In other circumstances amenorrhœa must be regarded as *pathological.*

Cases of amenorrhœa may also be classified into primary amenorrhœa when the patient has never menstruated, and secondary amenorrhœa when menstruation ceases after having been once established.

A useful practical division of cases is into two classes according to whether the menstrual flow is retained, and therefore only apparently absent (apparent or pseudo-amenorrhœa), or whether it is actually suppressed (true amenorrhœa), and the symptoms of amenorrhœa will be described under these headings.

APPARENT OR PSEUDO AMENORRHŒA.

In these cases some obstructing septum is present either in the vagina or cervix, which prevents the escape of blood and causes it to collect above the obstruction; such obstruction may be congenital or acquired. In the course of time a collection of blood is formed in the vagina (hæmatocolpos), uterus (hæmatometra), or

Fallopian tubes (hæmatosalpinx), according to the seat of obstruction and the length of time the retained fluid has been collecting. The cardinal symptoms of this condition will be apparent absence of menstruation, recurrent monthly pain, and the slow formation of a cystic abdominal tumour. The commonest cause of obstruction in congenital cases is a septum at the lower end of the vagina, immediately above the hymen, so that a hæmatocolpos can be felt filling the vagina on examination *per rectum*. Congenital stenosis of the cervix or absence of the vagina may also occur in rare cases. Such congenital malformations may affect one half of a double uterus and vagina, and give rise to tumours which may cause considerable difficulty in diagnosis, since the patient menstruates regularly from the patent half of the genital canal.

Acquired stenosis of the vagina or cervix may occur after extensive sloughing of the vaginal tissues or after the acute vaginitis of zymotic diseases, especially in children, and also after operations on the cervix. Similar extensive sloughing has been caused by too energetic treatment of vulvo-vaginitis in children (see p. 286).

TRUE AMENORRHŒA.

As already stated, this may be physiological or pathological. The former only includes cases before puberty, during pregnancy and lactation, or after the menopause.

True Amenorrhœa due to Physiological Conditions.

Before Puberty.—A slight hæmorrhage may issue from the vagina of an infant a few days after birth, but otherwise bleeding should not take place till the onset of puberty, which occurs in this country at the thirteenth to the fourteenth year. The tendency is for menstruation to start earlier in some races than in others, but there is always considerable individual variation, and it is quite common for menstruation to start as early as the eleventh or be delayed until the fifteenth or sixteenth year without any abnormal condition being present. When puberty has not occurred by the seventeenth year, it should always raise a suspicion that some congenital abnormality may be present which may cause a permanent primary amenorrhœa; but in a certain proportion of cases it will be found that there is nothing organically wrong with the patient, and that the "periods" are simply starting late—the so-called "delayed puberty." Such cases are probably connected with some disturbance of the ductless glands (*vide infra*). It should be remembered that pregnancy may occur before the onset of menstruation.

Pregnancy and Lactation.—The absence of uterine hæmorrhage at these times may perhaps be regarded as a protective mechanism to prevent waste of substances (such as calcium) which are needed elsewhere by the organism. Amenorrhœa is absolute during pregnancy. Any hæmorrhage which does occur is due to a threatened miscarriage, or more rarely to some other cause, and not to menstruation. During lactation, especially when it is prolonged, menstruation may occur, and should it do so more than once it may be an indication to cease suckling, since it may cause serious debility of the mother from excessive calcium excretion, and in a few cases upsets the baby's digestion. The amenorrhœa of lactation does not prevent pregnancy.

The Menopause.—The cessation of menstruation at the menopause is usually gradual, so that the patient loses less and less and the intervals become longer. Free hæmorrhage may occur after a considerable interval of amenorrhœa, but otherwise does not occur at the normal menopause. In exceptional cases the cessation is sudden. Accompanying the menstrual change there will be other symptoms of the menopause, such as flushings of the face, alteration in the body-weight, palpitation, headache, and nervousness.

True Amenorrhœa due to Pathological Conditions.

A. Due to Changes in the Generative System.

Here some local condition is at fault. Thus, it may be due to complete lack of development of the uterus and ovaries, or more commonly to a partial development, as seen in the rudimentary uterus, in which case the uterus is only represented by a small solid mass of fibro-muscular tissue not containing any mucous membrane. In all such conditions the amenorrhœa will be *primary* and *permanent*. There is usually a general lack of development, the patient looks younger than her age and the secondary sexual characteristics are delayed; but occasionally such conditions are found in well-developed women when no other developmental faults are present. In such cases the ductless gland systems are affected.

Diagnosis.

The diagnosis will be made by the general condition of the patient and by the rudimentary condition of the uterus or ovaries found during an examination under anæsthesia.

Treatment.

The treatment is unsatisfactory. In a patient who has reached adult life nothing can be done; in others, who come for treatment soon after the age at which puberty ordinarily occurs, an effort may be made to obtain further development of the ovaries by using preparations of the ductless glands, such as thyroid extract (gr. v. bis die) or pituitary extract (5 c.cm. once a week). This organo-therapy may be combined with the administration of calcium (gr. xxx. alterna nocte). Such treatment can hardly as yet be said to be on a scientific basis, but it is the only method which holds out any hope of success.

Destruction of the Ovarian Secretion.—This may be due to removal of or destruction of both ovaries. In cases in which the ovaries are removed by operation, menstruation usually ceases at once, or may continue in small amount for a few months before finally disappearing. The importance of leaving at least a piece of healthy ovarian tissue, in all cases in which it is possible, is now recognized by surgeons. In other cases attempts have been made to graft ovarian tissue into the uterus, broad ligaments, or abdominal wall. Such grafts may somewhat delay the onset of a menopause due to operation, but usually slowly atrophy. Similarly, ovarian or lutein extract may be given by the mouth in an endeavour to lessen the effects of a menopause due to operation; but the results are not very satisfactory.

Owing to the advances in abdominal surgery, it is now rare to find absolute amenorrhœa resulting from bilateral ovarian disease (tumour or inflammation), as nearly all such cases are treated surgically before such a stage is reached. To produce total amenorrhœa, it is necessary that the disease should destroy the whole of the ovarian tissue. This is occasionally seen in patients with bilateral and usually malignant ovarian neoplasms. In such cases the amenorrhœa is an unimportant symptom of a serious condition which urgently needs surgical interference.

Superinvolution of the Uterus.—This uncommon condition results from the autolysis which normally occurs during the puerperium not stopping at the usual time. Hence the uterus becomes smaller than before pregnancy occurred, and approximates to a congenital infantile uterus. Superinvolution has been described as a complication of Graves' disease, and also as a result of a parametritis constricting the bloodvessels of the uterus.

The administration of pituitary extract has been stated to do good when superinvolution has occurred.

AMENORRHŒA.

Apparent.		True.				
			Pathological.			
Congenital.	*Acquired.*	*Physiological.*	*Generative System.*	*Circulatory System.*	*Nervous System.*	*Ductless Glands.*
Closure of a part or of the whole vagina.	Closure of the vagina.	Before puberty.	Absence of uterus.	Anæmias.	Insanity.	Myxœdema.
Imperforate cervix.	Closure of the cervix.	During pregnancy.	Absence of ovaries.	Leucocythæmia.	Fright.	Acromegaly.
Closure of one half of a bicornute uterus.		During lactation.	Infantile uterus.	Repeated hæmorrhages.	Shock.	Obesity.
Closure of one half of a septate vagina.		After the menopause.	Small adult uterus.	Wasting diseases: Morbus cordis. Nephritis. Tuberculosis. Fevers. Malignant growths. Chronic infections.	Desire or fear of pregnancy.	Deficient calcium metabolism.
			Destruction of both ovaries by (1) tumour, (2) inflammation.			Deficient ovarian activity.
			Superinvolution of the uterus.			Change of work, surroundings, or diet.
			Removal of essential organs by operation.	Toxic conditions due to— Lead. Mercury. Alcohol. Morphia.		
				Chill just before the period.		

B. Due to Changes in the Circulatory System.

In all cases in which anæmia and extreme debility are present, the occurrence of amenorrhœa may be looked on as protective, in that it prevents a further loss of hæmoglobin increasing the existing anæmia. Such conditions (*e.g.*, chlorosis, heart disease, nephritis, and febrile states) are also frequently associated with excessive uterine hæmorrhage, and therefore it is probable that in such cases other undetermined factors play an important part.

Amenorrhœa due to these conditions requires no treatment in itself; it will cease to exist when the general health is once more normal. But, as it is commonly thought that the failure of general health is due to the absence of menstruation, such patients may be brought for advice only on the grounds that amenorrhœa is present. It is important in such a case to make a full investigation into what is the true cause of the failure of the general health, as in this way appropriate treatment of the disease (for example, early phthisis) may be begun at once.

Drugs which were formerly regarded as emmenagogues, such as iron, myrrh, and manganese, probably owed their reputation to their power of acting on cases of chlorosis, which is a very frequent cause of partial amenorrhœa in young women.

Chill.—Among the many evils supposed to result from "catching cold," disturbances of menstruation were always regarded as important. Although "catching cold" is not now regarded as the origin of all disease, it is a fact that after severe chill and exposure temporary amenorrhœa, partial or complete, has been frequently recorded, and is an occasional [illegible]. The true explanation of such cases is unknown. [illegible] general symptoms occur, these should be looked [illegible] coexisting disease, and not as being caused by the ab[illegible] of the menstrual flow. Such cases do not require any local or special treatment.

C. Due to Nervous Diseases.

From the pathological point of view, little is known about the cause of amenorrhœa in cases of disease of the nervous system, but a large number of cases have occurred in which menstruation has become disturbed after violent emotions. There are cases in which women who greatly wish to become pregnant, and others who fear that they are pregnant, may suffer from absolute amenorrhœa, which, together with the increase in the size of the abdomen resulting from flatulence or fat, may cause the condition known as pseudocyesis, or spurious pregnancy.

It need hardly be stated that amenorrhœa does not cause insanity. A large proportion of insane women do not menstruate—in fact, it is probable that, with increasing knowledge of the interaction of the ductless glands and the causation of menstruation, the whole of the cases which are at present referred to as of "nervous" origin will be classed with those cases which, on more or less scientific grounds, are now regarded as due to disease of the ductless glands.

D. Due to Diseases of the Ductless Glands.

At present few facts are actually established concerning the relation of the ductless glands to gynæcology, although a great deal of hypothesis has been evolved from the little that is known. As the result of these hypothetical considerations, efforts have been made to treat most gynæcological diseases, and especially menstrual disorders, with preparations of the ductless glands. Such organo-therapy can hardly be said to rest on a strictly scientific basis yet, but occasionally brilliant clinical results ensue, and with increasing knowledge more constant good effects should be obtained.

In a disease such as myxœdema, which is known to be due to thyroid deficiency, certain symptoms occur which include deficient menstruation and thickening of the subcutaneous tissues. Similarly in the case of cretins, in which there is a congenital lack of thyroid development, the onset of menstruation is retarded. It has been abundantly proved that the administration of thyroid gland extract cures these conditions, and that weight is lost and menstruation returns. Such patients may then become pregnant and bear living children. The administration of adrenalin may cure osteomalacia, which is also cured by ovariotomy, and enlargement of the adrenal bodies may coexist with sexual precocity. There is gradually accumulating a mass of similar facts which point to some co-relationship between the actions of each of the ductless glands. Hence the possibility of influencing the uterus and the internal secretions of the ovaries by means of the other ductless glands is indicated. When no well-recognized cause of amenorrhœa can be found, preparations of various glandular extracts may be tried. Thus, at the present time there is a tendency to treat many derangements of menstruation by administering preparations of thyroid, pituitary, ovarian, and lutein extracts, to which sometimes calcium salts are added. As so little is known as to the mode of action of such drugs, the results obtained are very uncertain; for example, the results of the administration of ovarian extract after oöphorectomy are disappointing. It should be remembered that the indis-

criminate administration of preparations of the ductless glands is not without danger, and therefore, while this form of medication is valuable when indications for it are present, it should certainly not be given indiscriminately.

Diagnosis and Treatment.

From what has been said above, it follows that amenorrhœa is usually a symptom of some other general or local disease, and therefore the diagnosis and treatment will be that of the underlying disease.

When a patient complains of amenorrhœa, pregnancy must first be excluded in every case by careful attention to the physical signs which may be present. It is more often in cases of secondary amenorrhœa than primary that pregnancy is found.

In the case of young women chlorosis is a very common cause; in others the periods may stop for a few months owing to changes in diet and surroundings when the patient moves from one part of the country to another.

In all cases in which grave general disease is absent, and in which there are not any local physical signs, it is usual to give laxatives with a tonic containing iron.

Cases with general or local disease will require treatment appropriate to the condition present.

CHAPTER VIII

HÆMORRHAGE

Excessive bleeding at the menstrual periods is termed menorrhagia, and this term should be confined strictly to excessive bleeding which retains its periodic character. Bleeding during menstrual life occurring independently of menstruation is termed metrorrhagia. Metrostaxis is the term applied to bleeding after the menopause or before puberty. These terms describe symptoms only, and not diseases.

Since the body of the uterus is concerned with menstruation, it follows that menorrhagia, when not due to general causes, usually results from some disturbance of the body of the uterus: whereas metrorrhagia without menorrhagia may proceed from lesions of the genital tract below the level of the internal os. Generally speaking, continuous hæmorrhage is associated with the extrusion either of some foreign body from the uterus, such as a polypus, a cast, or products of conception, or with ulceration, as in cases of carcinoma. Occasionally menorrhagia and metrorrhagia may go together. For example, a patient with fibroids may have excessive catamenial and intermenstrual losses. Since the two conditions may result from similar causes, and may be present in the same patient, they will be considered here together. Excessive uterine hæmorrhage may be due to general or to local disease.

General Causes.

Chronic constipation is a possible cause of menorrhagia. Other alleged causes are cardiac disease, especially when it affects the mitral valve, chronic emphysema, chronic bronchitis; but it is doubtful how far these conditions can be regarded as common causes. Excessive uterine hæmorrhage also occurs sometimes for a short time after marriage. Hæmorrhage from the uterus may occur occasionally in diseases such as purpura, scurvy, chlorosis, acute leukæmia, pernicious and other anæmias, malaria, lead-poisoning, alcoholism, and the hæmorrhagic forms of the acute specific fevers.

It may occur also in chronic renal disease, in which not only is the composition of the blood altered, but the blood-pressure is raised and arterial degeneration is present. In the cases associated with anæmia, the process acts in a vicious circle, as the anæmia increases the amount of the hæmorrhage, and the excessive hæmorrhage increases the anæmia.

In some of the blood diseases the monthly periods are little affected. For instance, in some cases of purpura there may be little increase. Calcium metabolism is deficient in many cases, and in some the ductless glands are at fault, as in exophthalmic goitre.

Puberty and the Menopause.—Slight hæmorrhage *per vaginam* may occur during the first few days of life. Although this is nearly always small in amount and requires no treatment, it may give rise to considerable alarm amongst those in charge of the child.

At puberty the onset of the catamenia may be accompanied by menorrhagia of some violence, and, similarly, the climacteric may be associated with excessive hæmorrhage. In such cases it is thought that the co-ordination of the ductless glands is at fault, but exactly where the fault lies is not known. It cannot be insisted on too strongly, however, that excessive or irregular bleeding at the time of the climacteric should always be assumed to be due to carcinoma, until this has been definitely excluded by examination of the cervix and of the cavity of the uterus.

In some cases of neurasthenia and general ill-health, excessive uterine hæmorrhage occurs. The causal connection between these conditions and the hæmorrhage is unknown, but may be vasomotor.

Local Causes.

The local conditions which cause bleeding may for practical purposes be divided roughly into two classes—those connected with pregnancy and those not connected with pregnancy.

Hæmorrhage connected with Pregnancy.—A period of amenorrhœa usually precedes the onset of the hæmorrhage. This class includes abortions of all kinds, unavoidable and accidental hæmorrhage, hydatidiform mole, ectopic gestation, subinvolution, chorionepithelioma, and inversion of the uterus. These conditions are dealt with elsewhere.

Hæmorrhage not connected with Pregnancy.—The second class of cases is mostly connected with the body of the uterus and the appendages, although irregular losses of blood may occur from malignant growths, lacerations and ulcerations of the vulva, vagina, and cervix, from urethral caruncles, cervical polypi, and erosions.

The most frequent uterine causes of excessive hæmorrhage are submucous fibroids and overgrowth of the endometrium. Menorrhagia also accompanies chronic metritis, acute and chronic salpingitis, pelvic inflammation, retroflexion, and some ovarian tumours, especially when the pedicle becomes twisted or when they are malignant. Chronic constipation is very important both by itself and as intensifying other causes. Carcinoma, sarcoma, and chorionepithelioma of the uterus cause bleeding or a blood-stained discharge, but have little influence, as a rule, on menstruation.

Diagnosis and Treatment.

Menorrhagia and metrorrhagia are to be looked on, not as diseases, but merely as symptoms. Hence, as a rule, the treatment and diagnosis will be that of the disease which causes them. Occasionally, however, no obvious disease is present, and in such cases it may be that the amount of thrombokinase present in the endometrium is deficient.

It should be remembered that a blood-stained discharge is often a symptom of ulceration of the genital tract, as in the case of any other mucous tract. Since the most important cause of ulceration in the genital tract is malignant disease, in every case in which this symptom is present a local examination should be made—if necessary of the uterine cavity by curettage under anæsthesia. The chances of malignant disease being present increase as the menopause is approached. In all cases occurring before the menopause, pregnancy must first of all be excluded. The fact that a history of amenorrhœa is not obtained does not absolutely exclude pregnancy, since repeated hæmorrhage due to threatened abortion may be mistaken for menstruation, or a misleading history may be given intentionally. The diagnosis and treatment of hæmorrhage is conveniently considered according to the age of the patient.

From Birth to Puberty.

The vaginal hæmorrhage of newborn infants has already been referred to (p. 69). No treatment is necessary. In children the precocious onset of menstruation may give rise to hæmorrhage. The menses are apt to occur irregularly and at long intervals at first. Unless excessive loss occurs, no interference is called for in these cases. Pregnancy may occur before the onset of menstruation, and for this reason all the conditions which cause bleeding from the gravid uterus must be excluded; sarcoma of the uterus and ovarian teratomata must also be excluded.

At puberty menorrhagia is frequent, and is perhaps connected with imperfect co-ordination of the ductless glands. In such cases the chest and abdomen should be examined to exclude other causes, and, if none are found, the treatment will consist in giving laxatives, cod-liver oil, calcium lactate (gr. xxx. every other night), or normal horse-serum. If improvement does not take place rapidly, small doses of pituitary extract and thyroid extract may be tried in turn. If chlorosis is present, iron is indicated. In severe cases plugging the uterus may be required. Some cases are very serious, even though the amount of blood lost would not be excessive in an adult, and may even end fatally, unless hysterectomy is done in time.

From Puberty to the Menopause.

During this period the hæmorrhage may depend on such causes as pregnancy, fibroids, malignant disease, pelvic inflammation. In the absence of any local causes, the bowels should be regulated, and ergot, hydrastis, and calcium should be tried. At the menopause bromides may be usefully combined with ergot in cases in which carcinoma has been definitely excluded. In severe cases rest in bed may be necessary during the first few days of the bleeding. Curettage may be done, both as a curative measure if an overgrowth of the endometrium is present, and also because valuable information may be obtained from microscopic examination of the tissue removed. At the same time, also, the condition of the appendages may be more perfectly ascertained. About the time of the menopause, especially, it is important to examine microscopically all tissues removed by the curette, since otherwise early cases of carcinoma cannot be diagnosed with certainty. It must be admitted, however, that, particularly in elderly patients, curettage sometimes entirely fails to stop the bleeding. This may be because chronic metritis is present, or because the hæmorrhage is due to a deficiency of thrombokinase in the endometrium. In cases that resist treatment with the ordinary drugs, vaginal douches at a temperature of 117° F. may be given to make the uterus contract, or pituitary extract may be injected intramuscularly. In desperate cases the vagina should be plugged. This, if done at all, must be done efficiently with a roll of sterile gauze passed through a speculum and retained in place by a T bandage. A vaginal plug is painful to the patient, and may cause retention of urine. The bladder must therefore be emptied before the plug is inserted. Since such plugging does not treat the cause of the hæmorrhage, it should only be resorted to on rare occasions and as a temporary measure. If all other treatment fails, hysterectomy may be necessary.

At the Time of the Menopause.

Hæmorrhage occurring at the time of the menopause must be distinguished carefully from that occurring after the menopause. Generally speaking, the onset of the menopause shows itself in one or other of three ways:

1. The monthly flow may become progressively less until it disappears.

2. It may cease suddenly once and for all.

3. There may be a series of excessive hæmorrhages.

With regard to the last, it is a sound rule to consider any loss definitely greater than the usual monthly flow as being due to some pathological cause, unless such loss occurs only after a period of amenorrhœa, and unless, if repeated, it has been again preceded by a period of amenorrhœa.

Further, in the absence of physical signs showing some other cause for the hæmorrhage, such as fibroids, the first step taken in the way of treatment must be an exploration of the uterine cavity under anæsthesia, in order to exclude the presence of carcinoma. If carcinoma is not present, the curettage may stop the hæmorrhage. If it does not do so, the drugs already mentioned may be tried together with rest in bed during the period of loss. In some cases the hæmorrhage is so persistent or so severe that hysterectomy is necessary. When carcinoma is found in an operable stage, hysterectomy must of course be performed.

Post-Climacteric Hæmorrhage.

Hæmorrhage from the genital organs occurring after the menopause should always be regarded with the greatest suspicion, and the first opportunity should be taken to examine the patient, be she single, married, or a widow. This is a rule to which there is no exception, since the commonest cause of such bleeding is carcinoma of the uterus and it is only by detecting this disease in its early stages that a cure can be hoped for. The subject of excessive and irregular hæmorrhage at the menopause, for which a cause cannot be found, has already been discussed.

Diagnosis.

Certain causes of post-climacteric hæmorrhage are easily diagnosed by sight or touch, such as malignant disease of the vulva, vagina, and vaginal portion of the cervix, and large pedunculated caruncles of the urethra. Ulceration of the cervix and vagina due to an ill-fitting or neglected pessary, or to friction when the uterus

and vaginal walls are badly prolapsed, and mucous polypus and fibroid polypus of the body of the uterus projecting through its neck, may all be causes of post-climacteric hæmorrhage, and an examination will detect them. Their characteristics are dealt with in other parts of this book. Syphilitic and tuberculous ulceration of the vagina or vulva will be diagnosed, if there is any doubt, by microscopical examination.

If a cause for the hæmorrhage cannot be discovered in the vulva, vagina, or vaginal portion of the cervix, a bimanual examination may fairly commonly detect an ovarian tumour, possibly malignant, or very rarely an enlarged Fallopian tube (carcinoma), as the cause of the post-climacteric hæmorrhage.

The ovaries and tubes appearing normal, the body of the uterus and the intracervical portion of the cervix are now the only possible sites of the disease causing the bleeding. If the body of the uterus is enlarged, the question of a fibroid or of carcinoma of the uterus must be considered.

Carcinoma of the body of the uterus rarely enlarges this organ to a size greater than a two-months pregnancy, and the enlargement is soft and uniform, unless the cancer involves the outer surface of the uterus. A fibroid, on the other hand, may increase the size of the uterus to a much greater extent, and the uterus will be hard and irregular. Nevertheless, fibroids of the uterus so rarely of themselves cause post-climacteric bleeding, that a careful intra-uterine examination should be made in such cases, to ascertain the cause of the bleeding, which is most likely to be carcinoma of the endometrium. The fact that the uterus is fixed would be an additional indication that the bleeding was due to carcinoma.

As a rule, when carcinoma has enlarged the uterus sufficiently for it to be felt per abdomen, the patient will complain of pain, and there will be an offensive discharge, wasting, and depreciation of the general health. Bleeding occurring after the menopause, in a patient known to have a fibroid, may be due to degeneration of the tumour, but is most often due to carcinoma of the endometrium. Further, the older the patient, the more likely is the cause of the bleeding to be cancer.

The uterus, however, may be normal in size, in which case the cause of the hæmorrhage is still most probably due to cancer; but it may be due to senile endometritis, a mucous polypus, or to some undiscoverable cause, in which case the symptom is called metrostaxis.

As carcinoma of the ulcerative type does not enlarge the body of the uterus, and as the bleeding may be intermittent in character,

and an offensive discharge does not appear till the disease is advanced, this cause of the bleeding can only be diagnosed by an intra-uterine examination.

Senile endometritis gives rise more often to a sero-purulent or serous discharge of an offensive odour than to one of pure blood, but in many cases senile endometritis is the precursor of carcinoma. A mucous polypus can only be detected by an intra-uterine examination.

Hæmorrhage occurring from the atrophied uterus of an old woman in whom the vaginal cervix is represented by a mere dimple at the top of the vagina is almost always due to carcinoma of the supravaginal cervix or senile endometritis.

Treatment.

It cannot be too strongly insisted upon that in all cases of post-climacteric bleeding, the cause of which is not at once apparent, the cervical canal should be dilated and the origin of the bleeding settled. In nearly all cases in which the bleeding has been more than a stain—*i.e.*, in which there is bleeding rather than a blood-stained discharge—the cause will be found to be due to cancer.

In connection with the subject of post-climacteric hæmorrhage, in all cases in which the bleeding is not seen to be actually coming from the genital passages, it is necessary to make sure that the blood is not coming from the rectum or bladder, before its source of origin is attributed to a genital organ.

CHAPTER IX

LEUCORRHŒA

Cause.

This term is used to designate any opaque white or yellowish discharge from the vagina in excess of the normal secretions.

The term is often used in a loose manner, both by medical practitioners and laity, to designate any vaginal discharge without any regard to its character, whether watery, mucoid, opaque, or actually purulent. Strictly it should only be used for a white discharge ("the whites"), which is only very little in excess of the normal vaginal secretion. It must be remembered that the vaginal secretion is really a mixture of the secretions from the body of the uterus, the cervix, and the vagina itself, with, during sexual excitement, that of Bartholin's gland. The amount of the mixed vaginal secretion is sufficient to keep the vagina moist, but disappears by drying at the vulva. There should not in health be sufficient moisture at the vulva to stain a garment. Normally the mixed secretions form a pasty fluid, containing mucus from the cervix, watery fluid from the body of the uterus, and a very small amount of watery transudation from the vaginal mucous membrane, mixed with shed epidermal cells from the latter. Obviously, therefore, this mixed secretion can be increased in amount by excess of any of its fluid constituents derived from the uterus or vagina.

The commonest source of increased secretion is the cervical canal, because it is the part of the generative tract which is most easily infected and inflamed. The vaginal walls are the least likely source of increased secretion, because the epidermis lining the vagina is not easily infected in ordinary circumstances. Thus, the commonest cause of leucorrhœa is cervical catarrh or endocervicitis, and the discharge has a more or less characteristic appearance owing to the large amount of glairy mucus which it contains. This cervical catarrh follows most commonly a very mild infection after labour or abortion, or it may be a sequela of gonorrhœa (see p. 200).

On the other hand, leucorrhœa occurs quite commonly in young girls who have not been infected with the gonococcus, and who have never been pregnant—in fact, who are *virgines intactæ*. All that can generally be found without inspection of the cervix in such cases is that the girls are anæmic, constipated, and generally in bad health. Even so, it is difficult to believe that there is no local lesion at all to account for the increased vaginal secretion. It is not sufficient to suppose that anæmia and constipation will set up an increased vaginal discharge. These cases of leucorrhœa are very chronic, may persist for years, and do not necessarily disappear when the patient is cured of her anæmia and constipation. As a matter of fact, if the cervix of these young patients is inspected, for example, when a dilatation is to be performed for dysmenorrhœa, some evidence of catarrh of the cervix is frequently found in the form of a small ring of reddened points around the external os uteri. This must mean that there has been a very mild form of inflammation set up by some infection. As there are always bacteria in the vagina, it is not difficult to see how the infection arises if once the patient's resisting power is lowered by chlorosis and constipation.

Sometimes, too, leucorrhœa will follow upon an acute illness of any kind, not necessarily an exanthem, but merely the result of local infection from general lowering of the resisting powers.

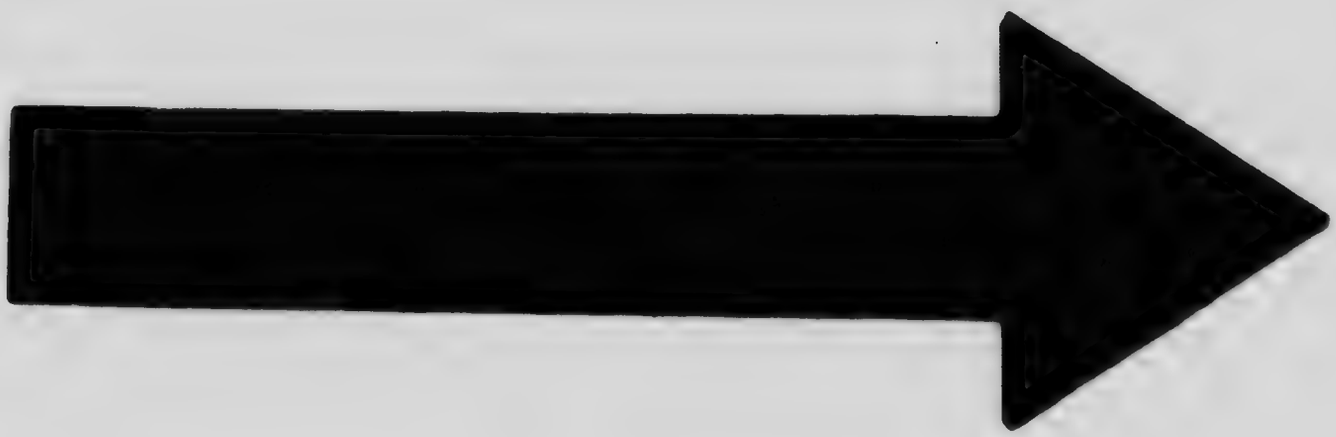
Such mild cases of leucorrhœa, like the more severe cases of uterine discharges in general, are apt to become worse just before and after menstruation. Sometimes the only days on which the discharge occurs are those immediately following menstruation. Not infrequently the discharge disappears altogether as the patient's general health improves, only to make its appearance again if ill-health supervenes.

Diagnosis.

Some judgment is required to know when a vaginal discharge is of that unimportant character which it has in young anæmic girls. In general it may be taken for granted that, when a girl is anæmic and constipated, and has a slight vaginal discharge, without any other local symptoms pointing to an active infection, the condition is a trivial one and needs no local investigation. It is a difficult matter to inspect the cervix in a virgin without an anæsthetic, and is quite unnecessary in most of the cases. It is quite another matter if the discharge is free, if there is vulval excoriation, scalding micturition, or pelvic pain. In such cases the usual diagnostic methods must be employed, and the case treated according to its causation and severity.

Treatment.

The treatment of vaginal discharges depends upon their cause, and will be discussed in the sections dealing with cervical catarrh, mucous polypi, gonorrhœa, etc. In the case of the mild leucorrhœa of anæmic girls, no special local treatment is indicated as a rule. General treatment, if successful in restoring good health, is usually followed by lessening or cessation of the discharge. If very chronic or increasing in amount, astringent douches may be used; but it is always unsatisfactory to prescribe douches for young unmarried girls, thereby concentrating their attention on their generative organs.



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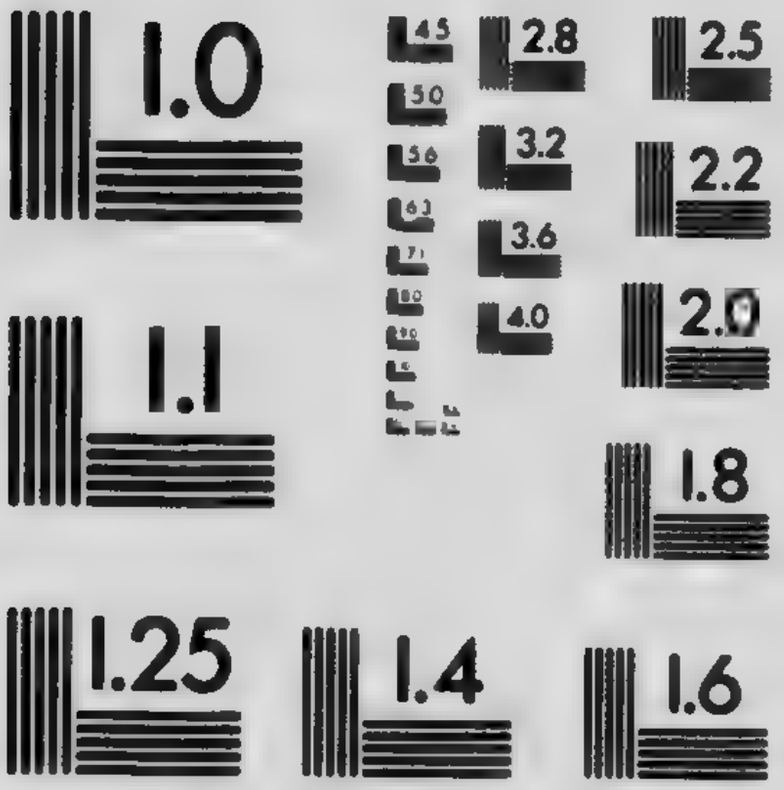

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CHAPTER X

MENSTRUAL PAIN (DYSMENORRHŒA)

A CONSIDERABLE proportion of civilized women experience more or less discomfort, or even pain, during menstruation—hence the expression "being unwell" commonly used to describe these periods.

As a rough working definition, any degree of pain during menstruation sufficient to interfere with a woman's WORK or pleasure may be placed in the category of dysmenorrhœa.

CLASSIFICATION OF THE TYPES OF DYSMENORRHŒA.

It is extremely difficult to draw up a thoroughly satisfactory classification of the varieties of dysmenorrhœa. A classification drawn up on an anatomical basis is unsatisfactory, and one founded on a pathological basis is impossible in the present state of our knowledge. A classification on a clinical basis, though not ideal, is the most generally useful, as it allows of a differentiation of the various types commonly met with in practice. On this basis cases of dysmenorrhœa may be divided into two main groups:

1. Dysmenorrhœa without physical signs.
2. Dysmenorrhœa with physical signs.

DYSMENORRHŒA WITHOUT PHYSICAL SIGNS.

The Nulliparous or Spasmodic Type.—The majority of cases of severe menstrual pain come under this heading, and by far the commonest is that variety which is usually called "spasmodic" dysmenorrhœa. This, however, is an unsuitable name, since in most cases the pain is not of a spasmodic nature. It is rarely felt during the first year or two of menstrual life, but begins as a rule when the patient is about eighteen or nineteen years old. The pain begins at the onset or shortly before the onset of the flow, and lasts from a few hours up to the whole of the first day. It is a constant gnawing ache, located by the sufferer in the middle line of the lower abdomen; but sometimes an acute colicky pain is added,

in which the patient finds it impossible to be still, but writhes or is doubled up. Nausea, vomiting, fainting, headache, or violent evacuation of the bowels, may occur. Although the duration of this may be only a few hours, the patient may be incapacitated by the effects for days. It rarely persists in its original severity after childbirth, and is usually cured by labour, but women the subject of severe dysmenorrhœa are frequently sterile. It is relieved or cured in a large proportion of cases by dilating the neck of the uterus.

The Cause of the Pain.—It might be thought that when menstruation is accompanied by much pain some marked deviation from the normal would commonly be found in the genital organs, but this is not the case; in a large proportion of cases of dysmenorrhœa nothing grossly abnormal is discoverable.

A physical explanation of pain is extremely difficult, and often impossible, in the present state of our knowledge. It is well recognized that what will cause pain in one subject will scarcely affect another. One man will receive smiling a blow on the head that would knock out another. And it is well known that the same person will feel pain differently at different times. In other words, the appreciation of pain depends in some way on the individual's nervous organization, and on her nervous state at the moment. So what causes trifling discomfort in one may cause severe pain and general nervous disturbance in another; and what may produce trifling pain one month may cause "agony" and fainting another month.

On examination, a nulliparous condition of the uterus is usually found, and in a certain proportion of cases sharp anteflexion and a narrow and ill-developed state of the vaginal cervix, the so-called "conical cervix" and "pinhole os."

The relation borne by these last two conditions to the menstrual pain has been much debated, as they may occur in women who menstruate without pain. At one time the pain was ascribed to the outflow from the uterus being obstructed, either by a kink in the canal at the site of the sharp bend, or by the narrowness of the cervical canal. The fact that dilatation of the cervix usually, and childbirth nearly always, relieves the pain, lends much colour to the obstructive theory; but against such a view are the facts that the pain is not necessarily of the colicky type that characterizes gross obstruction; that it is only in a small proportion of the cases that the deformities mentioned are found; and that it may exist with an abnormally patent state of the cervical canal. Moreover, in cases of true obstruction to the outflow of the blood, the uterine body is

found to be hypertrophied; no such hypertrophy is found in the cases under consideration. The view that obstruction is the cause of the pain is therefore no longer held.

Pain as a rule is the outcome of the stimulation of certain sensory nerve fibres, either by the agency of irritant substances or by pressure.

It has been suggested that menstrual pain may be due, in some way or other, to pressure on the sensory nerves of that part which is the seat of origin of the pain. This pressure might be brought to bear in two ways:

1. By a rise in the tension of the tissues of the part.
2. By contraction of the muscle fibres of the part.

That a rise in tissue tension is a common cause of pain is a matter of general experience, as witness all inflammatory conditions, especially when affecting situations where the tissues are rigid, or the pain produced by a bruise or hæmatoma, when the tissue tension is suddenly raised by an effusion of blood.

By analogy, then, the sudden influx of blood during menstruation into the genital organs, and more especially into the uterus, might well occasion more or less pain. Such an effect would be particularly probable in the case of the uterus, because there actual extravasation takes place, comparable with ecchymosis in any other situation. Pain produced in this way would be most marked at the onset or even before the onset of the flow—*i.e.*, before the tissue tension of the ecchymosed endometrium is relieved by rupture of its surface layer. It is significant that the commonest type of dysmenorrhœa has indeed this characteristic.

Passing to the general hyperæmia of the pelvic organs during menstruation, it is probable that the sense of heaviness and discomfort experienced by most women at these epochs arises from this cause.

In cases in which a hyperæmic state of the genital organs exists as a permanent condition, the increased flow of blood during menstruation will accentuate any pain arising as a result of the previous congestion, or may determine the onset of a pain felt at those times only.

Finally we have to consider how far the changes in the ovary coincident with the menstrual flow may occasion pain.

The increase in size of the Graafian follicle that leads up to dehiscence must increase the tissue tension of the ovary, and in certain circumstances may cause pain, as, for instance, when dehiscence is delayed or prevented.

The formation of the corpus hæmorrhagicum is another possible source of pain, due to raised tissue tension, and notably in the event of excessive hæmorrhage into the follicle (see Ovarian Blood-Cysts, p. 406).

It is possible that contractions of the uterus always accompany menstruation. There is, however, no proof of this as a normal occurrence, though it is certain that contractions productive of colicky pain do occur under abnormal conditions, when the outflow from the uterus is obstructed: as has been stated, however, in typical cases of nulliparous dysmenorrhœa, there is an absence of any evidence pointing to obstruction.

Another possible source of the pain lies in the liberation of substances irritant to the sensory nerves of the genital organs during menstruation. That certain substances, probably formed in the ovary, find their way into the blood-stream at this time is extremely probable, and to them one must attribute those extragenital phenomena which commonly accompany the "period," such as headache, depression, irritability, and so forth.

Where the disturbance lies, in a case of what is here described as nulliparous dysmenorrhœa, is therefore at present purely a matter of speculation. Why one healthy young woman of twenty should have pain so severe as to lay her aside from work and pleasure for two or three days each month, while another has not even discomfort, is not to be explained by any gross physical cause, for there is no difference in their pelvic organs which can be detected by our methods of examination. When the conditions in which this form of dysmenorrhœa occurs are considered carefully, it seems unlikely that the sole explanation will be found in the pelvic organs. The pain usually does not begin till some years after the onset of menstruation, often as the result of overwork, ill-health, and the complex life of modern civilization. It may begin when the girl goes to college and starts hard work for examinations, or when she leaves a country town, where she has had an open-air life, and works in a city office as a typewriter, or a waitress in an ill-ventilated and unsavoury restaurant. Again, menstrual pain is undoubtedly more frequent among the better educated and highly cultured classes and less frequent among the rustic women and working classes generally. It varies greatly in its incidence from month to month, according to the patient's health and surroundings: it is better when she is on holiday and leading an active open-air life, it is worse when she is overwrought and tired by exacting indoor occupations. Frequently it begins after an illness or after some severe nervous strain, such as nursing a sick relative or working for an examination.

When dysmenorrhœa is severe, it is more than pelvic and abdominal pain. It is often accompanied by symptoms such as headache, faintness, sickness, and neuralgia of various kinds, so that the patient lies in bed in a darkened room and refuses food. All this indicates that many factors are at work.

There is one variety of nulliparous dysmenorrhœa that merits special mention. It occurs in young women, often of the neurotic type, and is extremely severe and intractable. It is located in the iliac regions, and is accompanied by nausea, vomiting, and hysterical symptoms. Its cause is unknown, but in a proportion of the cases in which it has been necessary to perform an exploratory operation, on account of the severity of the pain, the ovaries are found to be small, very hard, and almost devoid of follicles. This condition used to be described as due to chronic ovaritis, but there is no evidence that it is the outcome of a true inflammatory process.

DYSMENORRHŒA WITH PHYSICAL SIGNS.

The Parous or Congestive Type.—It has already been pointed out that the sense of heaviness and discomfort which commonly accompanies the menstrual flow in normal persons is probably due to the general vascular congestion of the genital organs (and especially the uterus) which accompanies menstruation. Under certain circumstances actual pain is occasioned. This is notably so when the uterus is already hyperæmic from inflammation, subinvolution, or the presence in it of a new growth, such as a fibroid. The pain generally begins three or four days before the onset of the flow, and is relieved when the flow is thoroughly established. Its character and site vary according to the organ that occasions it. Thus, it may be of a "bearing-down" type, or may be felt chiefly in the sacral region (especially in cases of retroversion), or it may be referred to the middle line, radiating thence outwards parallel to Poupart's ligament on either side. It is a dull wearing pain relieved more or less by recumbency as a rule, and it may be accompanied by definite tenderness over the uterus. It is the variety of dysmenorrhœa commonly associated with endometritis, metritis, subinvolution, uterine displacement, and fibroids.

Menstrual hyperæmia always accentuates the pain of tubal disease. Thus, the pain of salpingitis is markedly increased during menstruation, and in subacute cases regular monthly recrudescences of the symptoms of pelvic peritonitis may occur. The pain is felt in the region of the diseased Fallopian tube or tubes, and is accompanied by increase in the local tenderness and swelling.

All painful conditions of the ovary are accentuated at the monthly periods. This increase in painfulness may be due to general hyperæmia alone, but in many cases its cause must be sought for in the changes taking place in the follicle.

Thus, it is possible that, when dehiscence of the follicle is prevented either by universal adhesions or peri-ovarian sclerosis of the ovary, the abnormal increase in the ovarian tissue tension produces pain.

In certain morbid states of the follicle not yet understood, excessive bleeding into it takes place after dehiscence. This hæmorrhage results in the formation of an ovarian blood-cyst (see p. 406), a condition associated with acute pain at the monthly period. Occasionally the cyst ruptures and the blood flows into the peritoneum, or the blood may flow direct into the peritoneum without the previous formation of a cyst. In either case violent symptoms suggestive of a ruptured tubal gestation are produced.

Obstructive Dysmenorrhœa.—Obstruction to the menstrual outflow gives rise to painful colicky uterine contractions. Obstruction may be (*a*) real or (*b*) relative—real when the exit from the uterus is occluded in some part of its course, relative when the menstrual products are unnaturally solid and bulky.

(*a*) **Real Obstruction.**—The two common seats of real obstruction are the vaginal outlet and the cervix. In the case of the former, the condition is a congenital one, the Müllerian segment of the genital canal failing to unite with the urogenital sinus, thus producing the so-called "imperforate hymen." In the case of the latter the condition is usually an acquired one, being due to scar tissue the result of some operation on the cervix, though occasionally it may be due to congenital want of development of the cervix. Menstrual pain due to real obstruction is, as has been said, colicky in nature, the spasms recurring with each futile attempt on the part of the uterus to expel its contents.

In the condition known as "imperforate hymen," however, it is important to realize that for some considerable time the uterus has no difficulty in emptying itself into the easily distensible vagina, and hence menstrual pain of the obstructive type is not at first present. But eventually the vagina becomes too full to allow further increase to its contents taking place easily, and the patient then begins to experience the violent spasmodic pains characteristic of uterine colic.

In the case of the cervix, on the other hand, the effect of the obstruction is much sooner felt, and when the blockage is situated at

the internal os, colicky pains are experienced from the first. When the obstruction is limited to the external os, the uterus may force the menstrual blood into the cervical canal above the obstruction, greatly distending it (hæmatotrachelos).

Dysmenorrhœa due to real obstruction is associated with apparent amenorrhœa in nearly all cases; but there is one important exception —namely, when a more or less double state of the genital canal exists, one half of which alone is obstructed.

The commonest condition to find in this connection is a non-developed uterine horn, which has failed to communicate with the vagina. If such a horn menstruates, the fluid accumulates in it and forms a cystic swelling to one side of the fully developed horn, and the patient experiences severe pains at the time of each monthly period.

As has been already stated (see p. 79), it was believed at one time that marked retroflexion or anteflexion of the uterus could so kink the canal as to obstruct it, but this is now deemed to be very doubtful, even in the most extreme cases.

It is possible, but not proven, that menstrual pain can be caused by tubal contractions. There is evidence that under rare conditions blood is transuded into the tube during menstruation, as in real obstruction to the uterine outflow, and occasionally in inflammatory conditions of the tube.

(*b*) **Relative Obstruction.**—By relative obstruction is meant that condition in which, though the calibre of the genital passage is neither closed nor abnormally narrowed, yet the products of menstruation are too bulky to pass through it easily. Three varieties of menstrual pain fall under this head.

Membranous Dysmenorrhœa.—Under certain abnormal conditions the surface layers of the endometrium are thrown off *en masse* during menstruation by an extravasation of blood into the deeper layers so profuse as to form a continuous sheet of blood. The uterine cast thus formed is expelled from the uterus by uterine contractions; and since it forms a mass overlarge to pass easily through the cervical canal, more or less pain is experienced during the process.

Two distinct classes of case are recognized. In the first the phenomenon has existed almost from the beginning of menstrual life, and the patients are usually young virgins. In the second the abnormality has been acquired as the result of changes in the endometrium following infection or childbirth. These patients are older women as a rule, married, and usually parous. In the first class of case the membrane is extremely thin, representing only

the most superficial layers of the endometrium; in the seco[illegible] is much thicker, and microscopically the stroma cells may exhibit great multiplication and hypertrophy, resembling the decidual hypertrophy of extra-uterine gestation. The pain in membranous dysmenorrhœa is at first of the continuous gnawing character suggestive of the nulliparous type, and may be caused by the excessive blood extravasation which is occurring into the endometrium. When the cast is separated and the uterus begins to contract, the pain becomes colicky in character until the expulsion is complete, when it abruptly ceases.

The Characters of the Cast thrown off in Membranous Dysmenorrhœa.—Two types of casts occur in these cases: the classical hollow cast, which preserves the shape of the cavity of the body of the uterus; and the solid cast, which bears only a superficial resemblance to the uterine cavity.

The second type of cast is much more common than the first, and is the one commonly found in parous women, who may be expected to have acquired some disease of the endometrium.

The solid cast is rarely more than ¾ inch wide at its upper part, whilst it is somewhat flattened from before backwards above, and more cylindrical in its lower part, ending in a rather blunt point. Microscopically it is composed of a fibrillated stroma crowded with leucocytes and red blood-corpuscles, with broken-up remnants of uterine glands, usually seen clearly near the outer surfaces. Connective-tissue cells derived from the endometrial stroma are seen amongst the extravasated blood-cells, sometimes enlarged, but never in any way resembling the cells of a decidua of pregnancy.

The hollow cast, on the other hand, measures about an inch at its widest part, [illegible] flattened from before backwards, and is composed of ti[illegible] ¼ inch thick. It has three openings in it —namely, tho[illegible] wo Fallopian tubes and that of the internal os. Its outer [illegible] is shaggy, whilst the inner is smooth, but divided up by shallow depressions giving it a honeycombed appearance. Microscopically it closely resembles the endometrium, with glands and cellular stroma showing blood extravasations here and there. The stroma-cells are often enlarged, but never take on the appearance of a compact decidua, such as occurs as a result of pregnancy. These casts have to be distinguished from decidual casts occurring in extra-uterine gestations, from abortions, and from blood-clots. A decidual cast is always made up of large decidual cells fitting closely to one another, without fibrillated stroma, and with comparatively few bloodvessels. The large polygonal or oval decidual cell is much larger than the enlarged cell elements

seen in dysmenorrhœal casts, and the latter cells never form a compact or spongy layer such as occurs in true decidual casts. If any doubt exists as to the identity of a cast, the question can always be settled by comparing a section of it with that of a true decidual cast.

Products of conception, as seen in early abortion or carneous moles, usually show chorionic villi if a complete search is made. In some cases, however, the chorionic sac is lost, only the decidual cast being available for examination. In such a case the diagnosis of a recent pregnancy is easy, but whether the pregnancy was extra- or intra-uterine cannot be decided.

Blood-clots naturally contain no endometrial structure, and show no products of conception.

Dysmenorrhœa due to Clots.—The question as to whether menstrual blood is capable of clotting under normal conditions is not yet decided, but it is certain that the passage of large clots from the uterus into the vagina is abnormal. The passage of such clots is accompanied by pain due to uterine contractions, and this form of dysmenorrhœa is usually met with in conditions in which the menstrual flow is too profuse, though excessive menstrual loss is not necessarily accompanied by clot formation or *vice versâ*.

The character of the pain is spasmodic, and is relieved for a while after the passage of each clot.

Dysmenorrhœa due to Menorrhagia.—Quite apart from clot formation, pain of an expulsive type may be produced by excessive bleeding, the inflow into the uterine cavity being in excess of the outflow. This form of dysmenorrhœa is most commonly associated with uterine fibroids, especially when the tumour has caused great enlargement of the uterine cavity without corresponding increase in the calibre of the cervical canal. The pain is recurring in character, each paroxysm being abruptly terminated by a great rush of blood, or "flooding," which may pour out on to the floor or soak through the patient's dress.

Diagnosis in regard to Treatment.

Before determining the treatment to be adopted in a case of menstrual pain, it is of the utmost importance to make an estimate of its source and severity.

Thus, the first point to be settled is whether it is dependent on physical abnormality or disease of the genital organs. In every case this can only be determined by an examination, and this is immediately advisable in married women and in all other cases in which the character of the pain suggests such a cause. In young

girls presenting the symptoms of typical nulliparous dysmenorrhœa, a physical examination may be delayed at the practitioner's discretion, since one knows by experience that physical signs are usually absent in this type.

In these cases, however, an examination must be resorted to if the pain is very severe or refractory to simple treatment. The difficulty of vaginal examination may be overcome by palpating the uterus through the rectum, if the bowel has been previously emptied by a purgative; otherwise an examination is best postponed until an anæsthetic is given for dilatation.

Presuming some abnormality is discovered, the problem will next arise as to whether it is the cause of the pain. Where some gross lesion or an inflammatory mass in connection with the appendages is discovered, the relation between the pain and the condition is usually clear. More difficult are those cases in which nothing but some slight displacement, such as retroversion, is found; for expert opinion varies considerably as to the extent to which the displacement mentioned is capable of causing pain. In such the character of the pain must be closely inquired into, and all other circumstances bearing upon it.

This is still more important in cases of the "nulliparous type," in which no physical signs at all are present. In such the character of the pain is usually described by the patient as being of a gnawing character, situated low down in the abdomen in the middle line. It is remarkable that, while in many cases the pain occurs regularly every month, yet in a considerable proportion it is intermittent, one or more painless periods alternating with the painful ones.

It may be found that the pain bears a definite relation to the patient's general health or spirits, being less marked or absent when she is well and happy, and worse when she is tired or mentally depressed.

The pain characteristic of nulliparous dysmenorrhœa begins on the first day of the flow, and is worst on and usually limited to that day; further, it is a continuous middle-line pain. Cases which depart from these characteristics are less likely to prove tractable to the treatment ordinarily adopted for patients of the "nulliparous type."

The mentality of the patient requires studying. Thus, a sensible, stout-hearted girl persistently complaining of severe pain each month falls into a different category from a highly introspective, hysterical individual whose bouts of pain occur chiefly when she is bored or tired, and never when she is in high spirits or has the chance of enjoying herself.

Finally, the patient's general health requires consideration.

Many cases of nulliparous dysmenorrhœa are not in good health. Chlorosis and chronic constipation are commonly present. The flow is very scanty in these patients. In others there is general asthenia or neurasthenia, the patient being below par physically and mentally.

Treatment.

The tendency of the practitioner should be to help the patient to make as light of her pains as may be possible, and not to encourage her to invalid herself on their account. This, of course, applies only to cases in which gross abnormality of the pelvic organs is absent.

In general, menstrual pain is relieved by recumbency, and when it is severe, and especially when accompanied by nausea or vomiting, the patient must lie down.

Immersion in a hot bath is comforting in many cases, and the popular idea that bathing at the periods is harmful should be dispelled. Hot fomentations to the lower abdomen are useful in some cases, and, when a markedly neurotic element is present, a blister over the area in which the pain is most acutely felt may be very successful. Many patients take alcohol, especially gin, to relieve the pain. This is a very bad habit, and should be strongly condemned by the practitioner. A far more efficacious and quite harmless measure is 5 drops of strong essence of peppermint in an ounce of warm water. This is always worth trying.

Drugs.—First to be mentioned amongst these is the large group of analgesics, of which antipyrin (phenazone) is the prototype. Of these the best known is aspirin: but there are many others, among which phenalgin and antikamnia may be specially mentioned. The best method of giving these drugs is in small quantities repeated at intervals of from one to two hours up to four or six doses. Five grains is the usual dose.

The effect is very marked in cases in which the pain is of short duration—in nulliparous dysmenorrhœa, for instance—but they are less serviceable when the pain is prolonged throughout the monthly period. There are two drawbacks to their use: first, that after a while their beneficial effect becomes less marked or disappears altogether; and, secondly, that they tend to the establishment of a drug habit in the patient. For this latter reason, therefore, their use should be withheld as much as possible, and in no circumstances should the practitioner countenance the patient drugging herself without his cognizance and sanction. These analgesics never cure the pain.

Next may be cited the bromides, which are indicated when a neurotic factor forms a large element in the suffering.

There are certain drugs credited with an indefinite sedative effect on the genital organs, one or other of which may be tried in suitable cases. They are aletris, viburnum, apiol, bryony, cotarnin, and lodal. They are more suitable for cases in which the pain is prolonged, but not violently severe. The true narcotics, opium, morphia, chloral, and so forth, are rarely indicated, and should never be used without the greatest caution, for fear of creating the habit. In general, it may be said that they should only be resorted to when the pain has a gross physical basis that is shortly to be removed by an operation. They are absolutely contra-indicated in that far larger class in which monthly pain exists without physical signs of abnormality.

If the suffering is so great that nothing less than narcotic drugs suffices to assuage it, and no lesser surgical measures have given any relief, then hysterectomy should be performed and the periods stopped for ever rather than run the risk of a drug-habit. Happily such cases are of extreme rarity.

Operative Treatment.

Common Nulliparous Type of Dysmenorrhœa.—Dilatation of the cervix under an anæsthetic is the most likely minor measure to ease this form of monthly pain. The rationale of the operation is not clear, since, as has already been pointed out, obstruction to the uterine outflow does not appear to play any part in its causation. The operation not only stretches the cervix, but the uterine body as well, and this may result in attaining a permanently less rigid state of the uterine wall by separating the opposing endometrial surface and facilitating the escape of the blood from the endometrium.

The dilatation requires to be carried out thoroughly, but should be immediately stopped when the cervix begins to split. Curettage of the endometrium is sometimes carried out in addition, but it is unnecessary unless the lining of the uterus is known to be unhealthy.

The operation relieves or cures a considerable percentage of these cases, but a certain number prove refractory. The reason for this is unknown. It is increasingly likely to fail the longer the patient has suffered, and it must be emphasized that its application to cases in which the character of the pain does not exactly conform to those of typical nulliparous dysmenorrhœa is unlikely to be successful. Such cases, though improved or cured for a time, relapse, and may require a repetition of the operation.

As childbirth usually cures the condition, the operation is especially indicated when in a married woman the nulliparous type of dysmenorrhœa is associated with sterility (see p. 79).

With a view to obtaining a permanently ultra-patent condition of the cervix, certain plastic operations on this structure are carried out by some authorities. As it is, however, extremely doubtful whether the calibre of the cervical canal *per se* bears any relation to the pain, they are not to be recommended.

Cases of nulliparous dysmenorrhœa are not infrequently met with in which the pain is extremely severe, and quite intractable to all minor measures, and the patient is seriously disabled thereby. In such, the question of removal of the body of the uterus (subtotal hysterectomy) will have to be considered. This measure is, of course, an absolute cure for all forms of monthly pain of uterine origin.

In the past, instead of removing the uterus, both ovaries were excised. This measure also stops the periods, and with them the pain; but inasmuch as it sacrifices healthy organs which are of value in the economy, apart from the uterus, for an organ which has no influence on the economy and no value apart from the ovaries, it is strongly to be condemned.

The most difficult of all these cases are those in which the pain is located in the ovarian regions and accompanied by marked hysterical symptoms. As has been said, in certain of these the ovaries are in a peculiar fibrous condition without trace of follicles, and it might be argued that their removal would entail no loss to the economy. This, however, would not appear to be the case, for these patients often present in unusual degree the feminine traits of emotionalism and hysteria. It is worthy of note that a similar condition of ovarian fibrosis is not uncommon in mares, and is associated in them with marked symptoms of nervousness and eroticism. Further, in dealing with an hysterical woman, there is always more or less uncertainty as to how far a mental factor enters into the complaint of pain. For these reasons it is best to exhaust all the palliative measures before resorting to operative interference.

When this is undertaken, ovarian graf ing might be properly performed on the painful side, in the hope that the ovary when deprived of its normal connections will cease to be painful. This proceeding, moreover, will act as a test as to the real location of the pain, for if it recurs in the same position it is obviously not ovarian.

It is probable, indeed, that in many instances of this class of case the pain is in reality uterine; for it may be observed that after hysterectomy monthly recurring attacks of pain in the region of the conserved ovaries is most extremely rare.

If, then, in spite of the transplantation of the ovary, the pain returns in the old situation, subtotai hysterectomy should be carried

out. When, however, after grafting, the pain appears in the situation of the graft, the graft should be removed.

The Parous Type of Dysmenorrhœa.—In these cases some abnormality of the uterus exists, such as subinvolution, endometritis, backward or downward displacement, a uterine fibroid, or disease of the tube or ovary, and the measures proper for them respectively are indicated. For these the reader is referred to the sections under their respective headings.

Inasmuch as in all of them the immediate cause of the pain appears to be the hyperæmia of the uterus or its appendages, means to reduce this can be with advantage adopted. Ergot is the chief drug used to this end, but there are others, such as hydrastis or cotarnin, which give good results in some instances.

The application of glycerin by means of tampons to the vaginal vault to deplete the local vessels is advised by some. Ichthyol, which is supposed to have some action on the vascular tension, is often mixed with it.

Various forms of douches, sprays, and baths, are also employed for the same purpose, while free purgation by salines is believed to act in the same way.

Obstructive Dysmenorrhœa.—When real obstruction exists, an operation for its relief is imperative.

This will differ according to the nature of the obstruction. Thus, an imperforate vagina requires an incision, an atresic cervix a plastic operation to open it, or, this being impracticable, removal of the uterus, while an undeveloped uterine cornu must be excised.

Membranous Dysmenorrhœa.—This is an extremely refractory form. Dilatation of the cervix followed by curettage is indicated. The removal of the endometrium is performed in the hope that on its reconstitution the defective habit may not recur. Unfortunately, this is rarely realized. The dilatation of the cervix should be thorough, so as to make the passage of the membrane, if it recurs, more easy.

Those cases in which the peculiarity appears in later life have a better prognosis. In the most severe cases, in which, perhaps, several repetitions of the dilatation and curetting have been tried and failed, nothing remains but to remove the body of the uterus.

Dysmenorrhœa due to Clots.—Some abnormality of the endometrium is present in these cases. If excessive bleeding is present as well, ergot or one of the other uterine styptics is indicated.

In general the best treatment for these cases is curettage, always supposing that no fibroid or other tumour is present in the uterus.

Dysmenorrhœa due to Menorrhagia.—In most of these cases the uterine cavity is enlarged, and in many of them uterine fibroids are present. The treatment of the monthly pain is therefore merged in the treatment of the condition causing it. Thus, if a fibroid is present, its removal by hysterectomy or myomectomy is indicated. A uterine polypus will need removal, while enlargement of the uterus due to chronic subinvolution or chronic metritis must be treated by ergot or curettage, or, as a last resort, by hysterectomy.

In all these cases drugs having a restraining action on menstrual bleeding are rightly used (see p. 71).

CHAPTER XI

ABDOMINO-PELVIC PAIN IN WOMEN

As patients do not come for medical advice duly labelled as "medical," "surgical," or "gynæcological," the student must bear in mind that there are other causes of abdomino-pelvic pain than those due to disturbance of the genital organs. Though pain by itself without other symptoms of general or local disturbance, or without definite physical signs of disease, does not justify a diagnosis, the pains commonly met with in the abdominal and pelvic regions are worthy of special consideration, as their character and distribution may help to indicate the lesions causing them. Also it is necessary to point out the further observations which can be made to elucidate their origin.

Pain can be considered from three aspects:

1. The character and distribution of the pain.
2. Pain with definite evidence of disease.
3. Pain without definite evidence of disease.

1. The Character and Distribution of the Pain.

Superficial Pain.—Superficial pain or hyperæsthesia of the abdominal wall is generally referred pain from disease of the internal structures (Head's areas), or may be a manifestation of hysteria. It is not a common symptom.

Deep-seated Abdomino-Pelvic Pain, aggravated by pressure, by constipation and menstruation, by the erect posture and movement, is usually present with any infective or congestive lesion.

Spasmodic Pain in pelvic conditions is commonly caused by painful uterine contractions, such as occur physiologically with labour and abortion. Pain of this type occurs in dysmenorrhœa and in the extrusion of uterine polypi. It may also be present with tubal gestation and the extrusion of a tubal mole. The pain is somewhat similar to that of intestinal and other colics and obstruction, and in its more severe forms cannot be easily distinguished from that caused

by torsion of the pedicle of an ovarian cyst and other abdominal conditions described under "the acute abdomen."

Bearing-down Pain is also a very frequent complaint among women, and is often associated with and due to the same causes as backache. The designation of this pain shows that it suggests the expulsive pain of the second stage of labour. It is sometimes described as a "forcing pain," and is frequently associated with other symptoms of weakness of the pelvic floor.

Various Shooting Pains in the vulva and vagina, scalding on micturition, and stabbing pains radiating from the lower abdomen and pelvis over the pubes, groins, and thighs, may be met with, and can be interpreted only by a consideration of the other conditions accompanying them. The severe and usually diffuse pains which occur in acute abdominal conditions, will be discussed under the "acute abdomen" (see p. 524).

Backache.

One of the commonest ailments of women is backache. Pain of this nature is at times associated with disease or displacement of the genital organs; hence women themselves, and, more's the pity, many of their medical attendants, have come to look upon such a symptom as indicating disease in that quarter, and its presence is assumed merely from this one symptom. Backache is ascribed, for instance, to congestion or displacement of the uterus, an extremely common diagnosis, but really a cloak for ignorance, for it is impossible to diagnose congestion of the uterus by a physical examination, and very often no displacement can be discovered.

The common custom of attributing every backache to uterine or ovarian disease will, every now and again, lead the medical attendant to miss a serious organic lesion in some other part of the body, an error which will neither redound to his credit nor conduce to that increase in his clientèle and banking account which he might legitimately have anticipated.

An error in diagnosis is less likely to be made if the patient is examined in a routine manner.

Backache may be considered in two classes:

Backache due to some definite abnormal condition.
Fatigue backache.

Backache due to Some Definite Abnormal Condition.

The pain may originate in the spine and spinal cord, the muscles of the back, certain abdominal organs, or in the genital organs.

Only a few of the principal points will be noted in connection with these conditions. For their more complete description the student is referred to other parts of this work or to textbooks on medicine and surgery.

The Spine.

Spinal Caries.—Caries of the spine first appearing in an adult is a rare disease, and in its early stages the backache has often been ascribed to pelvic disease. The pain is constant and increased by any movement of the spine, and is situated principally over the diseased area. On examination, there is distinct tenderness on pressure over the diseased vertebræ, and there is diminished mobility of the spine.

Malignant Disease of the Spine.—The backache is of a severe burning character, worse on movement, and is associated with paroxysms of pain of extreme severity. The malignant growth is generally metastatic and secondary to cancer of the breast. The commonest mistake to make is to attribute the condition in its early stages to hysteria.

Lateral Curvature.—Patients with lateral curvature complain of backache. An inspection of the back will lead to a correct diagnosis of its cause.

Osteo-Arthritis, Spondylitis Deformans, and the Spondylitis following Acute Fevers.—Backache in the lumbar region is a marked symptom of spondylitis due to infectious fevers. It is most commonly associated with enteric fever, and the pain, which is very troublesome, is felt when the patient first commences to get about.

Coccygodynia.—Coccygodynia of traumatic origin is associated with a very painful spot at the bottom of the back when the patient sits down, and on defæcation. There will be a history of a fall, blow, or difficult labour, and an examination of the coccyx may disclose that it is fractured, and it will be very tender.

Strain of the Sacro-Iliac Joint.—A common cause of backache which is frequently not recognized is a strain of the sacro-iliac joint. The pain is worse at night and after any exertion, and is increased if the thigh is flexed and the leg extended. Pain may be elicited if the thigh is flexed and the leg extended, by placing a hand on each ilium and moving the sacro-iliac joints, and there is nearly always present a very tender spot over some part of the joint. The patient in walking will lean towards the strained joint.

If the joint is firmly fixed by a bandage the pain disappears.

The Spinal Cord and Membranes.

Backache associated with a tumour of the spinal cord is extremely severe, constant, with paroxysms of a shooting character. Chronic spinal meningitis following an attack of syphilis causes severe backache, which is increased by movement and percussion of the spine.

The Spinal Muscles.

Lumbago, Muscle Sprain.—The pain in the back ensuing on an attack of lumbago is extremely severe, and is made much worse by the slightest movement. The patient is unable to bend or move the back in any way without great agony. There will usually be a history of exposure, and the affection is more common in people of rheumatic tendency. There is no hyperæsthesia or pain on pressure; on the contrary, the latter affords considerable relief. The pain only lasts for a few days, and is soon relieved by treatment.

Patients frequently complain of severe backache as the result of a sudden strain, as after lifting something heavy, or some violent movement, and may themselves suggest that it is due to an "internal displacement." These cases generally recover as the result of rest, followed by massage, and are probably due to rupture of muscular fibres or ligaments.

Certain Abdominal Conditions.

Aneurysm of the aorta gives rise to a very severe and constant backache, the pain spreading round the body. The abdominal tumour pulsates and is expansile; a thrill can be felt and a systolic murmur heard over the tumour. The femoral pulse will be retarded.

Diseases of the kidney may be the cause of backache, but not nearly so often as the advertisements in the public press would lead one to believe. Backache may be one of the first symptoms of tubercle and cancer of the kidney, and is occasionally present in acute nephritis. This symptom may be the only one present for a long time in cases of renal calculus, but an examination of the urine and by the X rays should suggest the source of the pain.

The backache of pyelitis and pyelonephritis is accompanied by fever and general malaise, while an examination of the urine should reveal the nature of the disease. Movable kidney may cause backache in those women who have been told that this organ is out of place; otherwise it is an uncommon symptom of this deformity. Pendulous abdomen with general enteroptosis, the right or both kidneys being specially movable, is a common cause of backache in multiparæ who have to work hard, as is proved by the relief given

by an abdominal belt. Cancer of the stomach gives rise to backache in the lumbar region, and this symptom is also associated with such diseases of the rectum as cancer, fissure, or hæmorrhoids.

The Genital Organs.

A dull, aching pain in the region of the sacrum may be an early symptom of prolapse of the uterus. Pelvic inflammation is at times associated with backache, and the weight or pressure of ovarian and uterine tumours may cause this symptom, whilst it is constant in a large proportion of women during the day or two preceding menstruation.

Fatigue Backache.

Backache is often a symptom of muscular and nervous fatigue, and is discussed more fully in Chapter XLIV.

If the muscles of the back are subjected to fatigue, backache of a dull, aching character results, which is increased by exercise and movement. There is no tenderness along the muscles, and if the cause of fatigue is discovered the pain as a rule is easily cured. The causes of backache due to fatigue of the spinal muscles are numerous, and include standing or sitting for many hours, bending over desks as in the case of clerks or school children, carrying heavy weights, continuous action of the spinal muscles to keep the body in its correct position, as in women who wear high-heeled boots or have extra weights to carry about in their abdomen (pregnancy, tumours). It may be of long standing and accompanied by enteroptosis and abdominal and general muscular weakness, or may be of recent origin.

2. Pain with Definite Evidence of Disease.

(*a*) With disease of the genital tract.

(*b*) With disease elsewhere in the abdomen and pelvis than the genital tract.

(*a*) **Pain due to Definite Disease in the Genital Tract.**—This will be found discussed in detail in the various chapters describing inflammatory affections, new growths, intraperitoneal bleeding, displacements, etc. Here only a few general considerations may be emphasized.

In the case of inflammatory conditions, the onset is rapid, and the pain usually so severe that the patient is forced to take to her bed at once, and medical advice is sought early in the attack. General disturbance, with fever, rise in the pulse-rate, furred tongue, and often vomiting, accompany it, and later the development of definite

localizing signs in the shape of an inflammatory mass generally makes the cause of the pain evident. Commonly the pain is due to a local peritonitis caused by salpingitis or appendicitis. In the first attack or the acute stage of a recurrent attack, the pain may be the first indication, and may be present before any definite signs of disease other than local tenderness and rigidity are present. When rigidity is marked, and specially if accompanied by much abdominal distension, the detection of a localized swelling may be difficult or impossible. Pelvic cellulitis is a rarer cause of pain, and is almost confined to puerperal women who have had other evidences of infection. The pain is usually aching or throbbing in character, and extends down the leg of the affected side. Commonly the signs of septic intoxication are marked.

The uterus is not a sensitive organ, and, apart from involvement of its peritoneal surface, the pain of acute metritis and endometritis is mostly of a throbbing and aching character, and not so severe as in salpingitis. The uterus is tender on examination, but movable, and the other pelvic organs appear normal. Marked tenderness of the lower abdomen, with rigidity, diminished respiratory movement, and distension, indicates peritoneal involvement. The pain due to chronic pelvic inflammation is not so acute, and may be of an aching character. As a rule, however, a history of an acute attack following a septic abortion or labour or gonorrhœa may be obtained, and, if recurrent, of attacks of an acute character, as described above. In the quiescent periods, when examination is easy, the enlarged, thickened, and fixed uterine appendages and impaired mobility of the uterus, will decide the cause of the trouble.

With intraperitoneal bleeding, from ectopic gestation, ruptured varicose vein complicating a uterine fibroid, ruptured ovarian cyst or follicle, the pain is severe, sudden in onset, accompanied by pallor or faintness or sickness, and in the more severe cases by the signs of internal hæmorrhage. The pain and the tenderness of the abdomen in intraperitoneal bleeding may be more severe even than in acute inflammation.

With new growths pain is not a characteristic symptom, at any rate in the early stages, unless some complication, such as infection, hæmorrhage, torsion, or rupture, has occurred. The common simple pelvic tumours, ovarian cysts and uterine myomata, are painless at first, though increasing size may cause a feeling of weight and aching from pressure on neighbouring structures. Degeneration in myomata may cause pain—the more acute the degenerative process, the more severe the pain—and malignant ovarian tumours, probably from the peritoneum being affected, also produce pain early. Pain

is rarely an early symptom of cancer of the cervix uteri, and does not arise until infiltration of the surrounding tissues has occurred. With the rarer carcinoma of the body, pain may begin early in the disease, either from contractions of the involved muscular wall or from distension of the cavity; sarcoma and chorion-epithelioma, being more likely to cause peritoneal involvement, may also give rise to pain early. Malignant disease of the Fallopian tube does not cause pain till the peritoneum is involved.

Growths of the vulva and vagina do not cause much pain unless inflamed or ulcerated. The chief disturbance is due to pressure, especially in walking or moving about.

The pain due to displacement is perhaps the most difficult of all to estimate, and reference may be made to Chapter XLIV., in which the part played by displacements in conjunction with other factors is discussed. As a general rule, it may be stated that the pain due to displacement is only felt in the acquired varieties and in the earlier stages of the deformity. Thus, it is an everyday occurrence to see in the out-patient department women with complete prolapse who state that they have no pain, and only seek relief because of the inconvenience and ulceration of the prolapsed part. The pain associated with the early stages of a displacement is of a dull aching and bearing-down character and chiefly felt in the back, and is doubtless caused by the pull on the ligaments and supports of the uterus and pelvic floor generally. Cases of sudden retroversion in which the uterus is gripped by the utero-sacral ligaments have been described as the result of some violent exertion or strain. The pain may be so severe that the patient will faint. The acute pain is succeeded by a dull ache with painful defæcation and tenderness of the retroverted body. Such cases are very rare.

(*b*) **Pain due to Disease in the Abdomen**—(1) *Of the Digestive Tract.*—Of abdominal affections, *appendicitis* is most frequently confused with disease of the genital tract, as the pain is due to the same cause—a local peritonitis. Reference may be made to the chapter on appendicitis, but here it may be stated again that the pain is generally higher and the pelvis generally unaffected, but that cases may occur in which the appendix hangs over the pelvic brim, becomes adherent to and involved with the uterine appendages of the right side, so that the physical signs are exactly those of a right salpingitis, and only a careful consideration of the history will allow a diagnosis as to the probability of the origin of the peritonitis to be made.

Intestinal pain due to such varying conditions as carcinoma of the bowel, constriction by bands or adhesions, mucous or ulcerative

colitis, lead colic or intestinal obstruction, may be a source of error in diagnosis. Carcinoma of the pelvic colon, especially if adherent to the left broad ligament, with possibly a faecal abscess, is readily confused with salpingitis. Local peritonitis round the growth or peritoneal extension of the disease may give rise to marked similarity of the symptoms. Careful consideration of the history of the case and the prominent symptoms, a rectal examination and the use of the sigmoidoscope, a bismuth meal and examination by X-rays, careful observation of the case by skilled nurses, and examination of the stools, will obviate error.

Cholecystitis, gall-stone colic, gastric and duodenal ulcer, and other conditions in the upper segment of the abdomen, are possible, but much less likely, sources of error, as there are usually fairly clear indications that the trouble originates at a distance from the pelvis.

(2) *Of the Urinary Tract.*—Renal and ureteral calculus, pyelonephritis, hydro- and pyo-nephrosis, cystitis, and even a distended bladder, may in special circumstances give rise to difficulty in diagnosis. The location of the pain, bimanual palpation of the kidney, the absence of colon resonance behind a tumour of doubtful origin, the passage of a catheter, cystoscopic and X-ray examination, with examination of the urine, chemically, microscopically, and bacteriologically, will serve to elucidate the nature of the case.

(3) *Other Abdominal Conditions* which only require mention here as a cause of pain are tuberculous peritonitis, mesenteric and other retroperitoneal cysts and tumours.

3. Pain without Evidence of Disease in Pelvis or Abdomen.

Many patients complain of abdomino-pelvic pain for which no physical basis can be discovered by even the most thorough clinical examination. That some physical cause is present cannot be excluded absolutely until the abdomen has been opened and the viscera examined; but this as a final resource cannot be adopted unless for very strong reasons, and even after it some obscure condition may remain undiscovered. But there is a large and common group of cases in which abdomino-pelvic pains occur for which there is no physical or mechanical basis, which are known as "visceral neuralgias" or "functional pain." Very rarely they are due to tabetic or other organic nervous changes; commonly they are the result of fatigue in the higher nerve centres, and are more fully discussed in the chapter on neurasthenia (see p. 539).

CHAPTER XII

PRURITUS VULVÆ

Pruritus vulvæ, or itching of the vulva, may be present as a symptom with or without any local abnormality. The itching may be present periodically or may be persistent. The irritation is usually worse at night or at any time when the patient gets warm. If the itching is persistent, it may become quite intolerable and make the patient's life a misery, and undermine her health by preventing her resting by night or day.

It occurs with the following conditions:

1. Irritating discharges
   - Leucorrhœa.
   - Glycosuria.
   - Cystitis or incontinence of urine.
2. Diseases of the vulva
   - Leucoplakia vulvæ.
   - Pediculi pubis.
   - Eczema.
3. Other causes
   - Pregnancy.
   - Varicose veins or hæmorrhoids.
   - Fistula in ano.
   - Thread-worms.

1. **Irritating Discharges.**—*Leucorrhœa* as the result of disease of the vagina, cervix, or uterus, may cause pruritus, though it is remarkable in how many cases of this kind there is no irritation of the vulva. Nevertheless the cure of a discharge is often followed by relief of pruritus.

Glycosuria.—Itching is often the first symptom that calls attention to the presence of sugar in the urine. For this reason it is most important to test the urine of every woman complaining of pruritus. The vulva in diabetes has a peculiar red, swollen appearance.

Cystitis or incontinence of urine may be associated with a minor degree of pruritus, especially in the neighbourhood of the urethra.

2. Diseases of the Vulva.—Leucoplakia vulvæ (*q.v.*) causes most intense itching of the vulva.

Pediculi pubis or dirt produces this symptom by causing a dermatitis.

Eczema may be seen on the vulva, but a more usual situation is in the folds of skin outside the vulva.

3. Other Causes.—Pregnancy, with the increased vascularity and congestion of the genital organs, occasionally gives rise to pruritus. In addition there may be varicosity of the veins of the vulva and a hypertrophic condition of the skin. Pelvic tumours, causing obstruction to the venous return, may act in the same way.

Fistula in ano or thread-worms may cause a reflex irritation of the vulva or may cause a direct infection from contamination with faecal discharges.

In other cases there is no cause or lesion to account for a periodic irritation of the vulva often associated with the menopause or the catamenia.

Diagnosis.

This can only be arrived at after a detailed examination of the genital organs, including the bladder and rectum, and, indeed, after the most minute examination it is often impossible to assign a cause to this symptom.

The importance of examining the urine cannot be too strongly emphasized. The vulva and accessory glands and ducts must be thoroughly looked at in a good light. The vagina and cervix must be examined with a speculum, and any irritating discharge tracked to its source. The anus and rectum as well as the fæces must be minutely inspected.

Treatment.

Where a definite lesion is discovered, this must be treated. If glycosuria is present, the amount of sugar can usually be reduced by an appropriate diet and drugs. If an irritating discharge is present, it can be controlled by douches or other means. The commonest type of disease which is present when the itching is persistent and of long standing is leucoplakia vulvæ, the treatment for which is dealt with on p. 291.

CHAPTER XIII

DYSPAREUNIA

By dyspareunia is meant pain or difficulty in coitus. The causes of this symptom may be considered in three classes:

1. Pain due to some local condition.
2. Difficulty due to some local condition.
3. Pain and difficulty in the absence of any local condition.

1. Pain due to Some Local Condition.—The possible causes of this pain are best considered in anatomical order.

In the *vulva*, a vulvitis, often a follicular vulvitis, or an inflammation of Bartholin's gland, or some local ulceration, may be the cause; or there may be a urethral caruncle; or kraurosis or vascular degeneration of the whole vulva may be present; or there may be a tender fissure of the fourchette. Atrophy of the vulva and vagina after the menopause is another occasional cause.

The *hymen* may be very rigid and show but a small opening, or it may be unduly tender, or there may be inflamed and tender hymeneal caruncles or fissures.

The *vagina* may be tender from inflammation.

The *uterus* may cause dyspareunia when it is retroverted and tender, or when its mobility is impaired by adhesions.

The *adnexa* may make coitus painful when the ovaries are prolapsed and tender; when an ovarian tumour lies in the cavity of the pelvis; or when the uterine appendages are matted and adherent from chronic salpingo-oöphoritis.

Another occasional cause of dyspareunia is anal fissure.

2. Difficulty due to Some Local Condition.—Those cases in which the dyspareunia is due to difficulty of local origin rather than to pain may also be considered in anatomical order.

The simplest case, though perhaps it is hardly correct to call it dyspareunia, is one in which the difficulty is due to complete ignorance of the act by both parties. Apart from this, the difficulty, when due to some local cause, is generally the result of some malformation

or the presence of some tumour. Narrowness of the orifice is much commoner than a malformation.

Thus, the *vulva* may be absent, or there may be an abnormally small ostium vaginæ.

In the *vagina*, there may be an "imperforate hymen" or a partial or complete septum somewhere in its course, or the vagina may be absent altogether.

More rarely there may be some tumour of the vulva or vagina, such as a cyst or a fibroid.

The *uterus* may be the cause of difficulty owing to hypertrophic elongation of the cervix, or a fibroid polypus might even project so far into the cavity of the vagina as to interfere with coitus.

3. **Pain and Difficulty in the Absence of Any Local Condition.**—*Vaginismus.*—A neurosis or psychoneurosis may give rise to dyspareunia by causing either hyperæsthesia of some part of the genital canal or spasm of the muscles about the vagina, especially the levator ani and sphincter vaginæ, which spasm in itself may be extremely painful; or the neurosis may produce both hyperæsthesia and spasm. This spasm, which in extreme cases may spread to the adductor muscles of the thighs, or even cause opisthotonos, is known as vaginismus.

Vaginismus may, of course, be superadded to, or even caused by, some local lesion, but it also occurs quite apart from any local tenderness or other discoverable local abnormality. The underlying cause in such cases may vary from mere excessive apprehension in a very nervous woman to some deep-laid psychoneurosis. The absence or feeble development of sexual feeling in the woman is undoubtedly a contributory factor in some cases, though a woman may have violent vaginismus in spite of strong sexual feeling.

There is a rare form of painful coitus in which the pain occurs, not during the act, but after the orgasm has passed. The cause of this is unknown.

Treatment.

The treatment of dyspareunia obviously consists in the treatment of the cause.

When the trouble is due to ignorance of the act of coitus, it generally cures itself in the course of a little time. If this does not come about, a little common-sense advice will put things right.

When there is some local lesion present, this must always be dealt with, whether there is a neurosis present or not. In the slighter cases of local tenderness, the use of an abundance of some lubricant, such as vaseline, by both parties may be enough. In

other cases 10 per cent. cocaine ointment may be used. It is sometimes wise to advise sexual rest for a time before the ointment is used. If more than this is needed, the woman should be anæsthetized and the orifice of the vagina should be thoroughly stretched. In some cases it is well to dissect away the remains of the hymen and to make one or more vertical incisions in the edge of the perineum, and to sew them up in such a way as to leave horizontal scars, thereby enlarging the orifice of the vagina. After the parts have healed, the patient may be instructed to insert into the vagina gradually increasing sizes of glass vaginal dilators thoroughly well lubricated, and to leave them in place for twenty minutes or so. No coitus should be allowed until the parts are not only healed, but completely sound.

The treatment of the other local causes of dyspareunia is discussed elsewhere in this book, and need not be detailed here.

When the vagina is absent, nothing can be done except transplantation of a piece of small intestine isolated from everything but its mesentery, so that it comes to lie between the rectum and the urethra in a space made for it there by dissection. This is a severe operation which is by no means free from risk, and can be justifiable only in very exceptional cases.

In those cases in which no local cause can be discovered, the treatment is essentially that of the neurosis or psychoneurosis underlying the condition. The slighter cases may perhaps be treated on the general lines described in the chapter dealing with chronic ill-health and neurasthenia in women in relation to pelvic disorders. The more severe cases can only be treated by the methods of the psychiatrist, possibly including psychanalysis; and even then can only be successfully treated when the cause of the condition is found to be one which can be removed.

Absence of sexual feeling has been treated by the administration of yohimbine or of damiana with success in the case of some animals. They may sometimes succeed for women, but they often fail. Yohimbine may be given in 5 to 15 minim doses of a 1 per cent. solution of the hydrochloride salt. Damiana may be given in ½ to 1 drachm doses of the liquid extract (B.P.C.).

CHAPTER XIV

STERILITY

STERILITY in w omen may be either absolute or relative.

Absolute Sterility.—If a female is born without ovaries or Fallopian tubes, or uterus or vagina, or if any of these organs have been entirely destroyed by disease or removed by some surgical procedure, then she is absolutely sterile.

Relative Sterility.—The majority of sterile women are included under this heading, for as long as a woman is possessed of an ovary, a Fallopian tube, uterus, and vagina, she cannot be said to be absolutely sterile. Such cases may be divided into two classes:

1. Those in whom some defect of a sexual organ can be discovered.
2. Those in whom the sexual organs appear to be normal.

1. **Those in whom Some Defect of a Sexual Organ can be discovered.**—The causes to be considered in this class may be dealt with on an anatomical basis.

Ovaries.—Unless both ovaries are totally destroyed by disease, ripe ova, capable of fertilization, may be developed in one or the other. It is a fact, however, that partial disease of the ovaries is often accompanied by sterility.

Fallopian Tubes.—Salpingitis is so frequently bilateral that the chances of a woman becoming pregnant when suffering from such a condition are very slight. It is true that the abdominal ostium of the tube which has become sealed by the inflammatory exudation may again become patent, but, unfortunately, this is probably a rare occurrence. The majority of cases of sterility in women are due to this cause, and follow gonorrhœa or streptococcal infection after miscarriage or labour.

Uterus.—A frequent cause of sterility in women is the presence of a fibroid in the uterus. It is a fact that a large number of women afflicted with fibroids become pregnant and have normal labours. However, it is undoubted that fibroids diminish the chances of

conception. Subperitoneal fibroids do not cause sterility; but interstitial fibroids, which cause excessive bleeding, and submucous fibroids and fibroid polypi, must be considered to be causes of sterility. It must be remembered that fibroids of the uterus are very rare before thirty years of age, after which time the chances of impregnation are materially diminished.

Chronic endometritis is undoubtedly a cause of sterility, the endometrium being so unhealthy that the fertilized ovum fails to become embedded, or, even if it does, the diseased decidua very frequently leads to early abortion.

Deformity of the uterus, as is seen in women with a conical cervix and pinhole os, is associated with temporary sterility, at any rate. In many cases pregnancy follows dilatation of the cervix.

Backward displacement of the uterus is credited with much more importance as a cause than is really warranted. It is true that sterility is often found in women thus afflicted; but if a careful examination is made in such cases, a large proportion will be found to be suffering from endometritis, salpingitis, or cervicitis, and the sterility is due to this, and not to the displacement. Nevertheless, occasionally women with uncomplicated displacement of the uterus become pregnant only when the malposition is rectified. Others become pregnant in the absence of any treatment, although a certain proportion of them miscarry in the early months.

Vulva and Vagina.—Diseased conditions of the vagina and vulva are a cause of sterility, and most of these have been indicated under the section dealing with dyspareunia.

Leucorrhœal Discharges.—What effect leucorrhœal discharges have on the spermatozoon is not known. It is probable that they diminish the chances of fertilization, but every now and again, unfortunately, a woman with a septic carcinoma of the cervix will conceive.

Pain or Difficulty on Coitus.—Pain or difficulty on coitus, due to some local disease or obstruction, is a cause of sterility from obvious reasons.

2. **Those in whom the Sexual Organs appear Normal.**—The cause of sterility in women in this class of case is very difficult to determine. The matter is partly dealt with under the section on functional dyspareunia.

It must be remembered that, apart from any fault in the male and any discoverable disease of the genital organs, a woman cannot be said to be sterile until at least four years have elapsed since the date of marriage. How long a woman should be left untreated, in the sense of dilating the cervix, in such cases, is a matter of opinion,

and depends partly on her age and chances of sexual congress, since a large number of women, owing to the absence of their husbands for some reason or other, have not the same opportunities of being fertilized in four years as others have in four months. It is probably correct to dilate the cervix if the woman has not become pregnant within eighteen months or two years after marriage.

It should not be forgotten, also, that the most likely age for a woman to become pregnant is between eighteen and thirty. After thirty the chances of a woman being pregnant for the first time are certainly diminished, and the chances decrease with advancing age, till at forty and over they are very slight.

Absence of the sexual orgasm is undoubtedly a contributive factor, though to what extent is not known. It is certain that many women conceive who have never experienced any gratification in the sexual act, and numerous cases are on record where impregnation has followed a rape on an unconscious woman. Sexual pleasure is not usually so strongly developed in women as in men, and tends in the majority to decrease markedly with increasing years and after childbirth.

There is a condition known as profluvium seminis which is not uncommon in sterile mares, and is present in many sterile women. In this condition the semen is ejected from the vagina as soon as it is deposited therein. How exactly such a complication influences sterility is not understood, but it is certainly an interesting fact that, whereas only one ovum is required, millions of spermatozoa are ejected at each emission.

Treatment.

The treatment of sterility in the female, when some defect of the sexual organs can be discovered, resolves itself into treatment of the condition discovered, and is dealt with under the respective headings or in the section on dyspareunia.

As regards the treatment by dilatation of sterility associated with conical cervix and pinhole os, it is necessary to add a few words.

The dilatation should be done just before, or, better, some think, just after, the menstrual period, because the fact is established, as far as it can be, that the most favourable time for impregnation is the ten days following the menstrual period. The greatest chance of success will be obtained if the woman lives a continent life for the month before the dilatation, and the dilatation is not carried too far. No doubt many failures are due to the cervix being split by the size of the dilators passed, and a certain amount of inflammatory reaction resulting therefrom.

If there is a leucorrhœal discharge in addition, and there is no observable disease to account for it, large douches of salt and water twice a day prior to the operation appear in some cases to increase the chances of a successful result, and the general health should, of course, be attended to.

In advising the operation of dilatation of the cervix for sterility, the woman should be informed that the operation is devoid of risk and will increase the chances of conception, though success cannot be promised. How successful this operation is is not known, as very few surgeons have performed the operation a sufficient number of times to base any positive conclusions as to its real value. It is, however, a very proper operation to perform, and always worth trying.

It is obvious that the percentage of successes will be high during the first two years of married life, since a large number of these women would have become pregnant apart from such treatment, hence, in arriving at any conclusions as to the value of this operation, it is important to check the date of its performance with the time sexual congress has been possible.

Owing to the war, the anxiety of a large number of women to become pregnant within the first year or so of married life led them to increase their chances, as they thought, by having dilatation performed, and this operation assumed a value which is entirely fictitious.

When no definite abnormality can be found, the chances of impregnation become very remote. Functional vaginismus may be cured, and pregnancy follow. Artificial impregnation is undoubtedly successful with mares and cows, but, although pregnancy has followed such treatment in a woman, it has been done so seldom, or at any rate the published results are so few, that no proper opinion can be formed as to its value. Doubtless, if it had been successful in the majority of cases, more would have been heard of it. The treatment consists of injecting freshly emitted semen into the uterus by means of a syringe. It is stated to be preferable to fill the syringe after the semen has been ejected into the vagina. As a method of treatment it is not likely to become popular, and few women will submit to it unless they are desperate.

Male Sterility.—When subjecting any woman to treatment for sterility, it is always important to ascertain whether or no the fault is on the husband's side, and this is particularly the case when a careful examination fails to discover any cause for the sterility in the woman.

It is not necessary in this book to discuss to any extent the

causes of male sterility. It should be remembered, however, that male sterility may be due to imperfect development or destructive disease of the testes, the former being frequently, but not always, associated with undescended testes.

Stricture of the urethra and hypospadias are other causes, and the seminal emission should be examined to ascertain whether the spermatozoa are dead or absent.

SECTION IV.—MALFORMATIONS

CHAPTER XV

THE UTERUS, VAGINA, AND VULVA

CERTAIN conditions of greater or less clinical interest, which are usually considered together under the title of malformations, result when the processes of development do not follow exactly along their usual lines.

These malformations are best considered in three groups:

1. Those due to the development being arrested at some point along the normal line.
2. Those due to an error in development.
3. Those in which there is a combination of male and female elements.

1. **Arrested Development.**—This may be partial or complete.

Complete.

Congenital Absence of the Genital Organs as a Whole.—This is a very unusual condition, and is confined almost entirely to monstrosities. It is a condition of pathological interest only, as no treatment is of any avail.

Absence of the Uterus.—This is a very rare condition. There is usually some trace of the uterus. Its absence may or may not be associated with absence of the vagina.

Absence of the Vagina.—This occurs sometimes, the interval between the cervix and vulva being occupied by a fibrous cord.

Absence of the Vulva.—This is a very unusual condition. It is generally associated with some lack of development of the internal genital organs.

Partial.

The Genital Organs as a Whole.—Lack of complete development of the genital organs as a whole is not rare, and all degrees of it are met with.

Uterus—(a) Infantile Uterus.—In this condition the uterus maintains the shape it possessed at birth—viz., anteverted and acutely bent forwards. The cervix is long in proportion to the body, and the body is thin-walled and small. The cervix is conical, and the external os small. The other female organs may be affected, but they are not necessarily so.

Dysmenorrhœa, scanty menstruation, and sterility, usually accompany the condition, and in the more marked cases menstruation may be completely absent or nearly so.

(*b*) *Rudimentary Uterus.*—In this condition the uterus may be simply represented as a small button resting on the upper limit of the vagina, or the cervix may be fairly well developed, but the body be very narrow, the Fallopian tubes uniting at the fundus. The condition is generally accompanied by other malformations, and menstruation is usually absent. The secondary sexual characters may be absent or developed late, or they may not be affected at all.

Vagina.—The vagina may be shorter or narrower than usual, and such a deformity may or may not be associated with other malformations of the genital organs.

Vulva.—The whole vulva may be small or retain its infantile appearance, or the individual parts of it may be malformed; *e.g.*, the clitoris may be exceedingly small. Such deformities may be associated with other maldevelopments.

2. **Errors in Development.**—These are chiefly due to a lack of fusion, partial or complete, of the two Müllerian ducts; to a failure of the process of canalization of the Müllerian cords; or to an excessive development.

Lack of Fusion of the Müllerian Ducts.

Uterus Didelphys.—In this condition there is a complete lack of fusion of the Müllerian ducts. The vagina is divided into halves by a septum, and the halves of the uterus remain distinct externally. At the level of the junction of the cervix and vagina there is a union of the original ducts effected by means of the connective tissue derived from the genital cord. Each half of the uterus has its own tube and ovary. Each cervix has a normal appearance (Fig. 38).

Uterus Bicornis Bicollis.—In this condition there is an incomplete fusion of the Müllerian ducts, with the result that the two horns of the uterus remain completely separate as far as their cavities are concerned, and the cervix is divided by a persistent septum. The vagina may or may not be divided by a septum (Fig. 39).

Uterus Bicornis Unicollis.—In this condition there is an incomplete fusion of the Müllerian ducts, with the result that the body

FIG. 38.—UTERUS DIDELPHYS.

FIG. 39.—UTERUS BICORNIS ET BICOLLIS.

FIG. 40.—UTERUS BICORNIS UNICOLLIS.

FIG. 41.—UTERUS UNICORNIS.

The right half of the uterus is seen to be undeveloped—note the right round ligament.

of the uterus is bifid, but the cervix is normally developed. The horns may or may not be equally developed, but each communicates with the cervix (Fig. 40).

Unicornate Uterus.—In this condition only one of the Müllerian ducts has developed to produce one tube, the uterus and vagina. The result may be functionally perfect. The second duct is usually present in a rudimentary form with a canal that may or may not be patent, and there is usually no communication between the cavities of the two (Fig. 41).

Uterus Septus.—In this condition the ducts have fused externally, and so the uterus has a normal appearance externally; but it is partially or completely divided internally by a median septum. In addition the vagina may be septate (Fig. 42).

Fig. 42. Double or Septate Vagina.

It should be borne in mind that with all these conditions the vulva and hymen may be quite normal, as these structures are not developed from the Müllerian ducts.

Clinical Aspects.

A double uterus may not give rise to any symptoms at all. Menstruation may be quite normal, impregnation occur, and a normal

labour follow, without there being any reason to suspect an abnormality of any kind. On the other hand, there are various possible sequelæ:

1. The menses may be retained in one or both vaginal canals.
2. Dyspareunia may result from the vaginal septum.
3. One half of the vagina may be dilated if the patient is married.
4. Pregnancy may occur in one half of the uterus, and labour be apparently quite normal.
5. Pregnancy may occur in a rudimentary horn, and the symptoms and signs that result resemble those of an extra-uterine pregnancy (see p. 496).
6. A double pregnancy may result, and possibly retained products of conception may be left in one half.

If for any reason attention is directed to the possibility of a malformed uterus, the diagnosis of the particular type may sometimes be accurately made. On inspection of the vagina, the presence of two vaginal canals indicates a double uterus, as the process of fusion of the Müllerian ducts begins from below. If, however, the vagina be found to be single, the cervix may be divided, and the two external orifices of the two cervical canals may be seen. On vaginal palpation two separate cornua may be made out, with a definite depression between them. If there is a well-marked depression, the condition is either a uterus bicornis or uterus didelphys. In the latter case it will be found that the halves can be moved independently, and are separated down to the level of the external os, whereas in the former case the halves cannot be thus moved, and they are usually united for some distance above the cervical canal. If bimanually the fundus shows no depression, and there are two separate cervical openings into which two sounds pass, though they cannot be made to meet, revealing the fact that the uterine cavity is divided, then the condition known as uterus septus is present.

Failure of the Process of Canalization of the Müllerian Ducts.

Vaginal Atresia.—As a malformation, this is the result of an incomplete canalization of the Müllerian cords. It can be of varying grades, but the common type is that in which the lower end of the vagina is imperforate owing to the fact that the lower ends of the Müllerian ducts have failed to open into the urinogenital sinus. This should not be regarded as an imperforate hymen, as that structure arises as a membranous fold from the edges of the urinogenital sinus, and never forms, during its development, a complete septum.

Extensive areas of the vagina may be thus found occluded, but there is generally an unaffected portion just below the cervix.

Clinical Aspects.

The condition is usually not noticed until after puberty, when regularly recurring attacks of pain occur with the appearance of a cystic swelling above the pubes. If a considerable part of the vagina

Fig. 43.—Vaginal Atresia—So-called "Imperforate Hymen."
The septum is here seen bulging, with the hymen spread out on its lower surface.

is occluded there will be no bulging at the vulva. In the common type of closure of the lower end by a septum there will be bulging between the labia (Fig. 43).

This condition of the vagina affords no bar to the occurrence of menstruation, and when that function becomes established the menses are retained, so that the vagina becomes dilated and the condition of hæmatokolpos results. Occasionally, in cases of

double uterus, the atresia of the vagina may be unilateral, and, should menstruation occur, the products will be retained in the affected half.

Cervical Atresia.—This condition is much less common than vaginal atresia. When menstruation is established the uterine cavity becomes distended with blood, hæmatometra, and the Fallopian tubes may also be distended with blood, hæmatosalpinx.

TREATMENT.

Treatment of extreme grades is difficult. Attempts to form a new vagina have usually failed, although an artificial vagina has been made from a loop of intestine. If it is considered advisable to remedy the defect, a dissection should be made between the bladder and rectum, and an attempt made to establish connection between the unaffected portion of the vagina and the surface. The opening should be as large as possible, and the canal lined with skin. If great difficulty is encountered in finding the unaffected portion of the vagina, it may be of great assistance to open the abdomen and work down from above.

In the minor degrees, division of the septum, to allow the blood to escape, is all that is necessary.

In cases of atresia of the cervix and double uterus a plastic operation will be necessary, as the uterus must be removed.

Excessive Development.

Some conditions of a certain amount of clinical importance are produced when the development is excessive. This excess may be confined to the individual parts of the genital organs. Thus, hypertrophy of the clitoris and labia may result, and are occasionally seen.

Congenital Elongation of the Cervix.—This condition deserves attention, as it produces clinical symptoms. The elongation is confined to the vaginal portion of the cervix, and the external os may appear at the vulva. It may call for treatment if the condition is advanced, when amputation of the cervix will be necessary (see p. 577).

Accessory Tubes.—These usually are small tubes with a fimbriated extremity which occur at the ampullary portion of the tube. They are of some clinical interest in that they may give rise to small cysts.

Diverticula.—These consist of small pouches connected with the lumen of the tube.

3. **Combination of Male and Female Genital Organs.**—Occasionally there are born human beings in whom the development of the external

genitalia is such that the determination of the sex is impossible. Such children are frequently termed hermaphrodites, but a true hermaphrodite is an individual who possesses both an ovary and a testis, and in the human species they are very rare. Clinically it is often impossible to recognize them definitely, as the essential organs must usually be submitted to microscopical examination before conclusive proof of the presence of the condition can be supplied.

A much commoner condition is present in the group of cases known as pseudo-hermaphrodites, in which the external genitalia conform to those of one sex while the essential organs are of the opposite sex. Two types are thus found:

1. *Androgynous Pseudo-Hermaphrodites.*—These include by far the greater majority of the cases, the individuals being really maldeveloped males in that they have testicles, but the accessory organs resemble the female type. The penis is incompletely developed; the two halves of the scrotum fail to unite across the middle line. The testes may be undescended and remain in the pelvic cavity, or be in the genital folds in the groin.

2. *Gynandrous Pseudo-Hermaphrodites.*—In these the essential organs are the ovaries, but the external genitalia resemble the male type.

The clitoris resembles a penis, and the labia fuse in the middle line to give the appearance of a scrotum. The ovaries may be down in the labia, and the vagina may open at the root of the clitoris so as to resemble the condition of hypospadias in the male. The uterus may be quite well developed.

With these conditions a corresponding modification of the secondary sexual characteristics may be present. The presence and distribution of hair varies, and menstruation depends on the presence and development of the uterus. The mammæ may be fully developed. There may be a well-developed moustache or beard. At puberty the voice usually changes to that of a man in the androgynous variety.

The conditions are of interest, and at times of great importance clinically, as the correct determination of the sex is essential, and some serious errors have been reported. This determination is often exceedingly difficult, and is frequently impossible during the life of the individual. Inspection of the external genitalia does not usually afford any accurate evidence, and the only true test is the microscopic examination of the glands. When there is doubt, the child should be brought up as a boy, as the greater number have been found to possess testes. They are practically always sterile, as the testes usually do not produce spermatozoa.

Section V.—Uterine Displacements

Chapter XVI

Factors Governing the Position of the Uterus

By the term "uterine displacement" is meant any deviation from the normal position generally assumed by that organ, with regard to the pelvic and abdominal viscera. The term therefore includes all those changes in the direction of the uterine axis which are described as "versions" and "flexions." This means that the uterus may not only be displaced downwards, upwards, backwards, or laterally, as a whole, but also may be bent on itself to an unusual degree forwards, backwards, or laterally. It is usual to speak of descent of the uterus, ascent, retroversion or backward displacement, and lateral displacement, and also of retroflexion (backward bending), anteflexion (forward bending), and lateriflexion, when the uterine axis is bent on itself to one side or the other (lateral bending).

Normal Position of the Uterus.—To appreciate these deviations, it is necessary to have a clear conception of the normal position of the uterus in the pelvis. This is best realized by means of a diagram, and is shown in Fig. 44, which depicts the normal relationship of the uterus to the pelvic viscera. It will be seen that the uterus lies nearly horizontally, with its fundus directed forwards and resting upon the empty bladder, a double fold of peritoneum intervening for about two-thirds of the length of the uterus. The cervix, attached to the vaginal walls, lies nearly, but not quite, at right angles to the axis of the vagina. The anterior wall of the uterus is in contact with the bladder, whilst the posterior wall has small intestine touching it. It will also be noticed that the long axis of the uterus is slightly bent in a forward direction at the level of the internal os. This is known as the normal anteflexion of the uterus. It is therefore

quite correct to say that the uterus is normally anteverted with regard to the vertical line of the body, and also anteflexed.

Mechanism by which the Uterus is kept in its Normal Position.—The mechanism by which the uterus is kept in this position is a complicated one, and has been the subject of much controversy. It is clear, however, that there are several factors concerned, some of which are important, whilst others have had an exaggerated

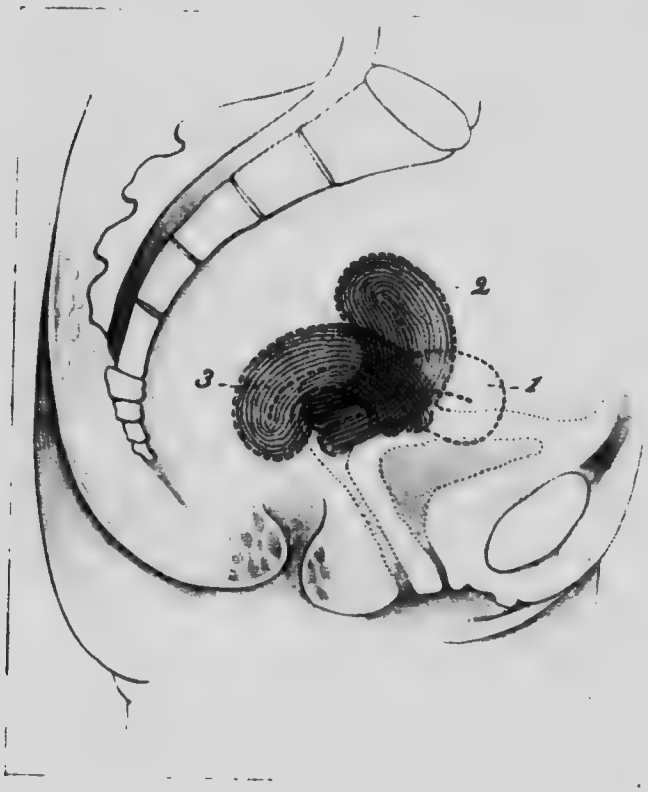


FIG. 44.—1, NORMAL POSITION OF THE UTERUS; 2 AND 3. RETROFLEXION AND RETROVERSION.

importance attached to them, and others are almost negligible quantities. The factors concerned are as follows:

1. The intra-abdominal pressure.
2. The integrity of the pelvic floor.
3. The connective-tissue sheaths of the uterine vessels, nerves, and lymphatics.
4. The uterine ligaments.
5. The size, weight, and consistence, of the uterus.

The Intra-Abdominal Pressure.—Strictly speaking, the pressure in the peritoneal cavity is negative when considered alone; but when the weight of the abdominal viscera is accounted for, the effect of respiratory movements, the results of the upright position, and the contractions of the diaphragm and abdominal muscles, it is clear that there is a pressure constantly exerted upon the abdominal viscera, and transmitted by them to the pelvic contents. As far as the uterus is concerned, the pressure is transmitted by the small intestines to the posterior wall of the uterus, and presses it down upon the bladder. It would naturally tend to force the uterus downwards, and with it the bladder, but this is resisted by the counter-contraction of the pelvic floor muscles, of which the levator ani is the most important. The final result is that the uterus is kept in close apposition to the bladder, not only when empty, but also when filling or filled with urine.

The Integrity of the Pelvic Floor.—The chief supporting structure in the pelvic floor, the diaphragm which loses the bony outlet of the pelvis, is the levator ani muscle and its fascia; and it is upon this that the bladder rests and consequently helps to hold up the uterus. But the levator ani is not a perfect diaphragm, seeing that it is perforated by the rectum behind, and the vagina and urethra in front. Between the two halves of the levator ani muscle there is a space known as the pelvic floor aperture, which, being comparatively narrow in healthy conditions, does not permit of any appreciable descent of the bladder when there is any increase of the abdominal pressure in the upright position. Consequently it follows that, if the bladder is securely held up, the uterus must also be well supported.

The Connective-Tissue Sheaths of the Uterine Vessels, Nerves, and Lymphatics.—It has been shown that there is a strong investing sheath of fibrous tissue and fat accompanying the bloodvessels of the uterus as well as those of the vagina and bladder. This sheath is continuous with the connective tissue enclosing the muscles at the brim of the true pelvis, known as the pelvic fascia, and it is believed that its integrity plays a considerable part in holding up the uterus and bladder. That part of the sheath which runs from the pelvic wall on each side towards the lower end of the uterus, around the uterine artery and vein, is almost horizontal in direction, and has been dignified by the title of the "lateral cervical ligament" or "ligamentum cardinale." It is highly probable that in a healthy condition this perivascular sheath, almost devoid of elasticity, does assist in holding up the uterus, at the point where it joins the uterine

muscle below the level of the os internum. It is, however, quite certain that it is not the sole support, as some authorities have maintained.

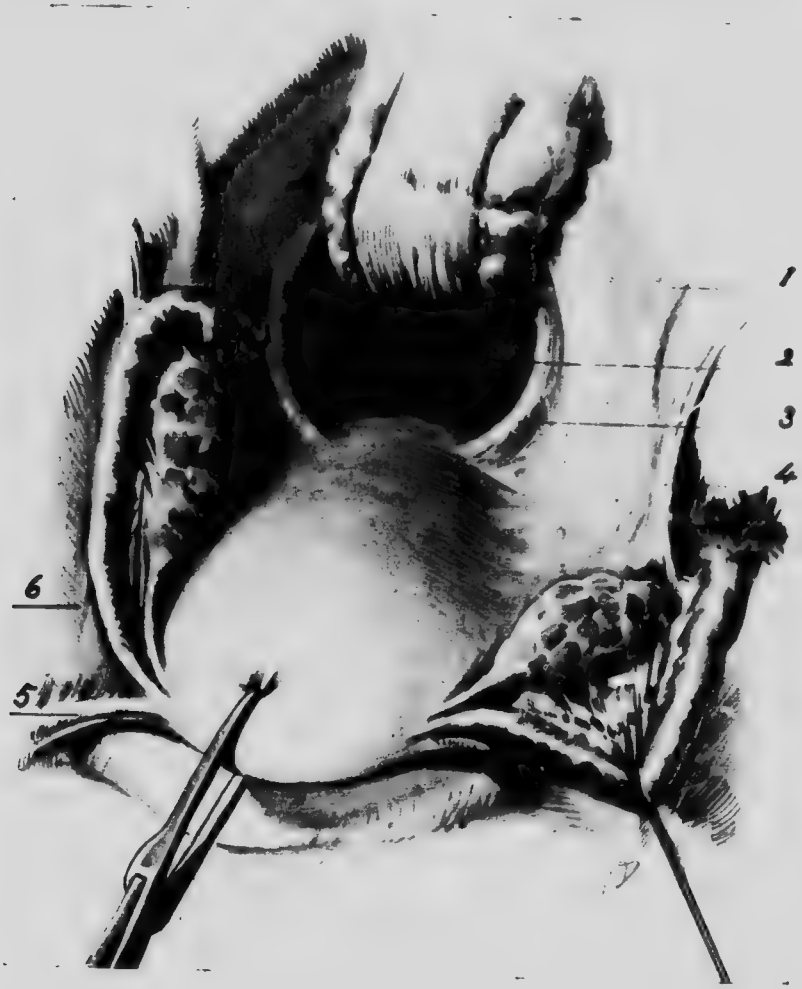


FIG. 45.—UTERUS PULLED FORWARD TO SHOW THE UTERO-SACRAL LIGAMENTS AND THE POUCH OF DOUGLAS.

1, Ureter; 2, pouch of Douglas; 3, utero-sacral ligaments; 4, ovario-pelvic ligaments; 5, round ligaments; 6, broad ligaments.

The Uterine Ligaments.—These are for the most part such lax structures, composed as they are of folds of peritoneum enclosing connective tissue, fat, smooth muscle, bloodvessels, nerves, and lymphatics, that they cannot have much effect in supporting the

uterus. The broad ligaments certainly have no such function, and it is doubtful if the round ligaments are even able to resist backward displacement of the uterus. They run a long curved course, and a very considerable degree of retroversion is possible before they begin to be put upon the stretch. If, however, the round ligaments are artificially shortened, they undoubtedly assist in keeping the uterus anteverted. The utero-sacral ligaments, running almost vertically upwards from their attachment at the level of the internal os, to the second piece of the sacrum, would seem to be in a position to prevent downward displacement of the cervical portion of the uterus. They are practically continuous with the perivascular sheaths above-mentioned, and therefore must be considered as playing some part. The utero-vesical ligaments are so small and inconspicuous that they are quite negligible in retaining the uterus in position (Fig. 45).

The Size, Weight, and Consistence, of the Uterus.—The part played by enlargements of the uterus has been misinterpreted, *qua* displacements, for it is clear that the larger the uterus the more difficult will it be for it, with the bladder, to descend through the pelvic floor aperture. If the weight, however, is increased without much increase in size, then this will certainly tend to make the uterus descend. The consistence of the uterus has an important influence in the production of flexions, for, apart from maldevelopment, it is only when the uterine muscle is softened and more pliable than usual that undue bending in abnormal directions is permitted at all. Abnormal flexions cannot occur with a healthy uterine muscle.

Clearly, the proportionate part played by each of these factors cannot be ascertained ; but that they all play some part is undoubted, and, in discussing the various displacements, the way in which the effects of these factors can be altered will be considered. One point should be emphasized—namely, that normally the uterus is a movable organ, capable of changing its position according to the degree of fullness of the bladder and of the rectum, and according to the direction and force of the intra-abdominal pressure, and also able to enlarge and rise out of the pelvis as a result of pregnancy. Permanent displacements impair the mobility of the uterus, quite apart from its absolute fixity due to organic adhesions.

In discussing the causation of displacements, it will be shown that pregnancy and labour are the chief underlying factors which alter the supporting mechanism of the uterus in general. There may be in each variety other special factors of some interest, yet they form such a small proportion of the causes of displacements that they are almost negligible as compared with pregnancy and labour.

The varieties of uterine displacements are as follows:

1. Prolapse or descent of the uterus.
2. Retroversion.
3. Retroflexion.
4. Retroversion plus retroflexion.
5. Anteversion.
6. Anteflexion.
7. Lateral displacements.
8. Ascent.
9. Retroposition.

It cannot be said that these varieties are always quite distinct; for instance, prolapse may occur with retroversion with or without retroflexion. Also retroversion plus retroflexion is more common than either variety alone.

CHAPTER XVII

PROLAPSE OF THE UTERUS

This is essentially a descent of the uterus from its normal position in the pelvis. It is, however, practically impossible for the uterus to descend alone, because the vaginal walls and the bladder are attached to it, and therefore these must always descend with the uterus to a certain extent.

The term "prolapse of the uterus" is therefore a misnomer, and it would be better if some other name were adopted, such as "pelvic floor descent." This is, however, a cumbersome term; from time immemorial the condition has been called "prolapse," and consequently the name is retained here. It is not possible, however, to consider uterine descent without a thorough understanding of the pathological anatomy of the condition.

The conception of the pelvic floor, or pelvic diaphragm, as put forward by Hart and Barbour offers the best solution of the difficulty. These writers described the pelvic floor as a very composite structure, including not only muscles and fasciæ, but also all those organs which are situated in near relation to the pelvic outlet. Accordingly, the pelvic floor can be divided into two parts, which Hart and Barbour named:

1. The movable, anterior, or pubic portion.
2. The fixed, posterior, or sacral portion.

The movable portion includes the retropubic fat, the bladder and urethra, the uterus, and the anterior vaginal wall. The fixed portion consists of the posterior vaginal wall, the rectum, the levator ani muscle and its fascia, the coccygeus muscle, and the perineal body (Figs. 46, 47).

That the pubic portion is movable can be seen during the progress of labour, when the bladder, its surrounding fat, and the anterior vaginal wall are drawn up above the pubes with the advance of the presenting part of the fœtus.

That the posterior part is fixed is likewise demonstrated by the

progress of labour, for none of the structures in it are actively displaced upwards or downwards, but are only pressed back against the sacrum or stretched by the presenting part. These statements, however, must be modified in the case of the posterior vaginal wall, because under some conditions, in prolapse, this becomes gradually stripped from its attachment to the rectum, and descends with the uterus. As will be shown, then, prolapse is essentially a descent

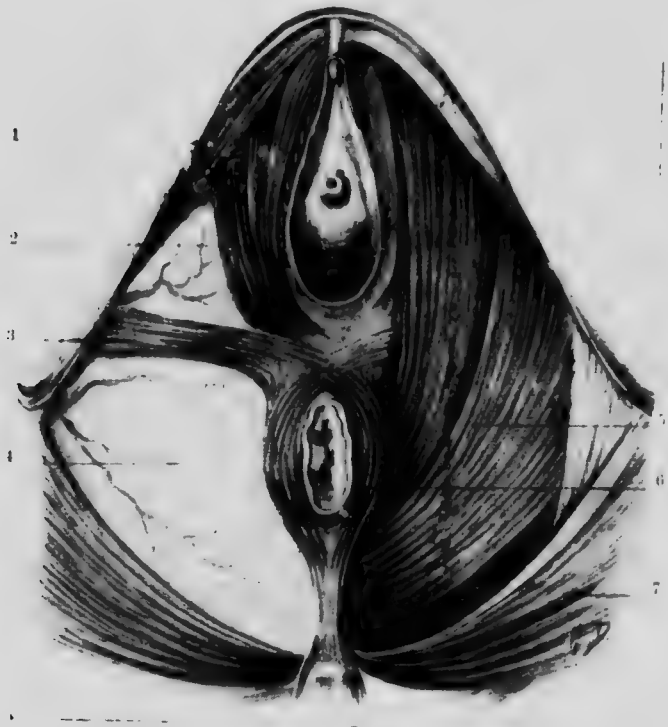


FIG. 46.—DISSECTION OF THE PELVIC FLOOR MUSCLES.

1, Ischio-cavernosus; 2, bulbo-cavernosus; 3, superficial transversalis perinei; 4, levator fascia; 5, levator ani; 6, sphincter ani; 7, gluteus maximus.

of all the movable structures in the pelvic floor. It is not out of place to show here that prolapse is also something more than this, as Hart and Barbour have argued. It is really a hernia of the pelvic floor, for, as the movable structures descend, some of the abdominal contents, small intestine, must descend as well to take their place. All the pelvic floor structures which are movable constitute the coverings of the hernia; the pelvic floor aperture is the opening through which the hernia descends; the sac is made of peritoneum, and the

contents are small intestine. This conception of prolapse does not assist in explaining it or in treating it, but places it clearly on a different footing from that of the other displacements of the uterus.

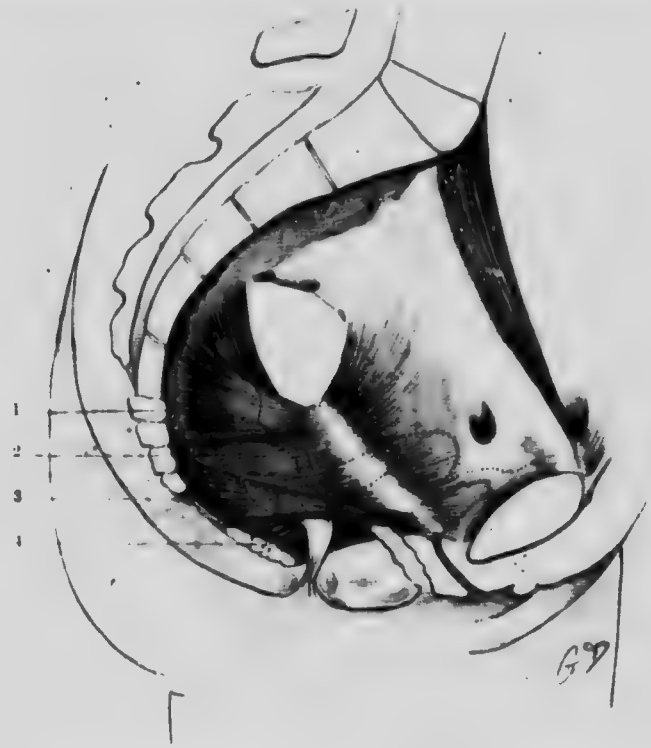


FIG. 47.—LATERAL VIEW OF THE INSIDE OF THE PELVIS TO SHOW ONE HALF OF THE LEVATOR ANI.

1, Coccygeus; 2, ilio-coccygeus; 3, pubo-coccygeus; 4, pubo-rectalis.

There are three degrees of prolapse commonly described, and it is convenient for descriptive purposes to retain them. They are—

1. Prolapse of the first degree, when the uterus is wholly within the vagina, and slightly lower than usual.

2. Prolapse of the second degree, when the uterus is partly within and partly outside the vagina. In this case the supravaginal cervix is usually elongated.

3. Prolapse of the third degree, when the vaginal walls are completely everted, and the uterus is wholly or partially outside the vulva. This is also known as "procidentia." The uterus in these cases is nearly always small and atrophied. The relation of the

bladder and rectum to these degrees of prolapse will be described when the sequence of events in the production of prolapse is considered.

Cause.

The great factor in the production of prolapse is pregnancy, labour, or abortion. This is the case because the factors which normally keep the uterus in position are commonly altered by pathological states brought about by childbirth. Inasmuch, however, as prolapse occurs sometimes in virgins, or in married women who have never conceived, childbirth is not the only cause. But it can be shown that somewhat similar pathological states of the uterine supports may be brought about by other conditions than childbirth, amongst which hard work, insufficient food, insanitary surroundings, and general ill-health play an important part.

Childbirth leads to weakening of the uterine supports, chiefly by injury to the fixed portion of the pelvic floor, especially the levator ani and its fascia. The levator ani only obtains an attachment to the perineal body through its investing fascia, and consequently, if the perineum is badly torn and imperfectly repaired, there is a chance that the two halves of the levator ani will separate from one another to some extent, and so enlarge the pelvic floor aperture. This enlargement of the pelvic floor aperture may be brought about by mere stretching without visible tear of the perineum. This by itself does not necessarily lead to prolapse, because cases of complete rupture of the perineum occur in which there is no descent.

Subinvolution of the uterus, then, plays an important part, because, when the uterus fails to return in the usual time to its normal size and position, its ligaments and surrounding connective tissue also fail to recover their tone, and so remain relaxed and stretched. In this way the connective-tissue sheaths of the uterine and vaginal bloodvessels remain soft and relaxed, and so the uterus is loose in the pelvis.

With the pelvic floor aperture enlarged and the uterus loose, nothing remains but some increased strain from above (intra-abdominal pressure) to force the uterus downwards. Increased abdominal pressure is easily brought about by straining at defæcation, chronic cough, or heavy work, such as charing.

In addition to these general pathological results of labour, there is one special predisposing factor which is worthy of thought. If the perivascular sheaths play the great part in supporting the uterus which some writers believe, is there any special way in which these can be stretched and permanently relaxed? It must be admitted that there is, and it is brought into action in some cases of labour in

which the cervix dilates very slowly with early rupture of the membranes. In such cases the fœtal head is apt to be forced very low down into the pelvis, carrying the lower uterine segment with it. Also it is just in such cases that the forceps is sometimes used too early before the cervix is dilated, leading to a further dragging down of the lower uterine segment. This cannot fail to stretch the perivascular sheaths to a most unusual degree, and it is more than likely that in some cases they are so injured that complete recovery is impossible. It cannot be too strongly urged that the application of the forceps before the os uteri is retracted above the head is a potent cause of prolapse, as well as of other injuries, more or less severe, to the uterus and birth canal.

Seeing that increased abdominal pressure, laxity of the perivascular sheaths, and widening of the pelvic floor aperture, are the great factors in producing prolapse, it is not difficult to see how these very factors may be produced in those who have had no children. Ill-health, insanitary surroundings, starvation, and hard work, all may lead to general relaxation of the connective tissues of the body and absorption of the fat. In this way the perivascular sheaths may relax and allow the uterus to become loose, whilst the pelvic floor aperture is free to widen under the pressure of the descending movable portion of the pelvic floor.

The production of a cystocele (bulging of the bladder with the anterior vaginal wall) or rectocele (bulging of the rectum with the posterior vaginal wall), which must be looked upon as stages in the production of prolapse, will be described separately under the heading Sequence of Events in Prolapse, and cannot be looked upon as causal factors.

Although the uterus can be pushed down by tumours in the pelvis and abdomen, such cases cannot be regarded as true prolapse in the ordinary sense.

The Sequence of Events in Prolapse.—In general, descent of the uterus is a slow process, gradually tending to get worse, and only becoming complete after a considerable lapse of time. However, in some cases a complete procidentia is suddenly produced by some great straining effort, in which case it is strictly comparable to a hernia in other situations. These suddenly produced cases are more commonly found in virgins than in those who have had children; and although they form a very small proportion of the cases, they are of some interest, and, what is more important, are very difficult to cure.

In general, the first sign is a gradual bulging backwards and downwards of the bladder, naturally pushing the anterior vaginal

wall before it. This is the condition known as a cystocele, and it may coincide with the beginning of uterine descent, or it may exist for a time by itself. Naturally, the production of a cystocele is encouraged by an enlargement of the pelvic floor aperture, directly above which the bladder lies. As this cystocele enlarges, it must, by stretching the anterior vaginal wall, exert some traction on the anterior lip of the cervix, and so pull upon the uterus. If the uterus is loose, this pull will gradually cause retroversion, and descent

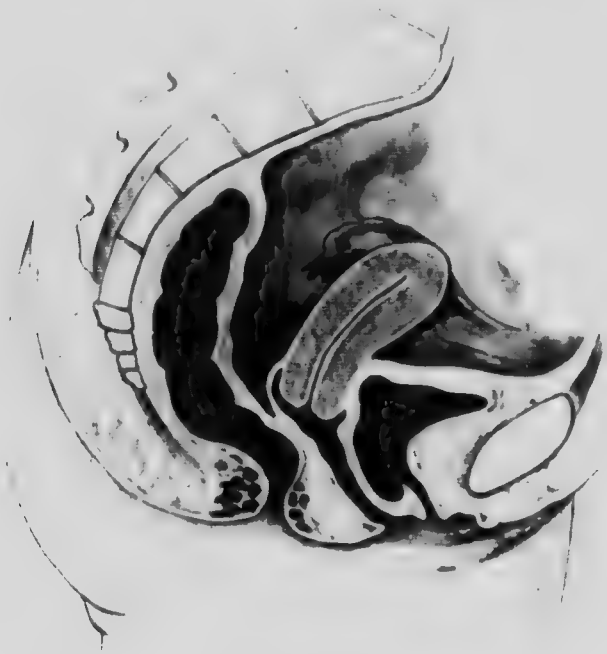


FIG. 48.—CYSTOCELE ALONE. UTERUS HAS NOT BEGUN TO DESCEND.

begins simultaneously, just as the uterus retroverts and descends when the cervix is dragged down with a tenaculum. In turn the descent of the uterus brings down the posterior vaginal wall, gradually separating it from its attachment to the rectum and lowering the posterior fornix. Incidentally the peritoneum must now be stretched at the bottom of Douglas's pouch, and gradually descends as the vaginal wall separates from the rectum. In time the uterus and cystocele reach the vulva, the cystocele leading, and later the whole movable portion of the pelvic floor may protrude outside the vulva,

with complete eversion of the vaginal walls. These stages in the production of prolapse are shown in Figs. 48, 49, 52, 53.

In some cases, however, instead of a cystocele, a rectocele precedes the uterine descent. In these cases there is not the same necessity for widening of the pelvic floor aperture, but it is commonly believed, and seems quite clearly proved, that some severe injury to the perineal body is essential. Adhesion of the vaginal wall to the rectum low down, without the intervention of the perineal body, completely

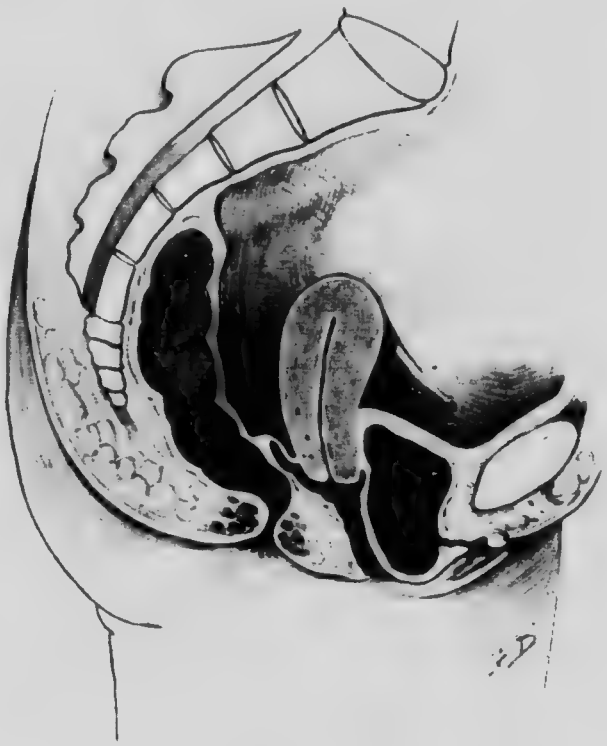


Fig. 49. Cystocele: First Stage of Prolapse.

alters the angle of direction of the lower third of the bowel, and consequently the direction in which a fæcal mass travels. The result is that during defæcation there is a tendency for the fæcal mass to be forced forwards, as in the direction of the pouch shown in Fig. 50, pushing the anterior rectal wall before it, and gradually making this wall bulge forwards over the internal sphincter ani. This forward bulging is a rectocele, and by putting the posterior vaginal wall on the stretch it will exert traction on the posterior lip of the cervix, gradually retroverting the uterus and making it descend if

loose. The sequence of events is then the reverse of that in which cystocele precedes. Not infrequently cystocele and rectocele occur together in the same case along with uterine descent. When the uterus is not obviously loose, cystocele or rectocele, or both, may occur without any actual descent of the uterus; but it is much more common to see quite a large rectocele without descent than even a small cystocele without descent (Fig. 50).

Fig. 50.—Cystocele and Rectocele occurring together, with Uterine Displacement.

In other cases the occurrence of a cystocele or rectocele has quite a different effect, depending upon the degree of looseness of the uterus. When the uterus is not at all loose, the traction exerted by the vaginal walls on the cervix gradually leads to elongation and hypertrophy of the supravaginal portion of the cervix instead of descent. On the other hand, if the uterus is partly loose, descent is slow and elongation of the supravaginal cervix occurs

as well. It is not at all uncommon to meet with prolapsed uteri in which the supravaginal part of the cervix is much elongated (Fig. 51).

Symptoms.

The symptoms of prolapse of the uterus are often quite indefinite, and might belong to almost any pelvic lesion. The first symptom is often a sense of something falling, as if the pelvic contents were protruding, although no actual protrusion exists. Along with this

Fig. 51.—Supravaginal Elongation of the Cervix with Cystocele: First Stage of Prolapse.

there may be dragging pain and backache referred to the sacral region. In cases which have existed some time, the patient may complain of something actually protruding at the vulva, which she describes as "like an egg." This is usually the bulging cystocele. Along with this there is generally some frequency of micturition during the daytime, but not at night. It seems as if the bulging bladder was rendered intolerant of distension, which would naturally be relieved at night when the patient is lying down and the parts assume their normal positions. In cases of extreme prolapse, when

a large portion of the bladder is really outside the vulva, there is always a difficulty in completely emptying the bladder, leading to the presence of a small quantity of residual urine therein. In such cases infection of the bladder and cystitis may result; but this is, however, a very rare complication of prolapse, even in extreme cases. Instead of frequency, there may be difficulty in starting micturition and in completely emptying the bladder. This is apt to occur in cystoceles of moderate size, whilst the uterus still remains

FIG. 52.—SECOND DEGREE OF PROLAPSE OF UTERUS, VAGINAL WALLS EVERTED: LARGE CYSTOCELE.

within the vagina. Such patients complain that they cannot micturate without first pushing up the bladder.

In other cases there may be the involuntary passage of a few drops of urine, or even complete evacuation of the bladder, whenever the patient coughs, sneezes, or makes a sudden movement. This form of incontinence is one of the most uncomfortable and irritating of the symptoms associated with uterine descent. It is curious, too, that it does not occur in advanced cases, but is only found in some

of the very early and non-progressive ones. All that can be found as a rule is a slight degree of cystocele, with some dislocation, and probably stretching, of the neck of the bladder. This seems to disorganize the normal relations which should exist between the bladder muscle and the sphincter at the neck of the bladder, so that the sphincter is not able to tighten up quickly enough when some sudden strain is put upon the bladder contents. This symptom does not

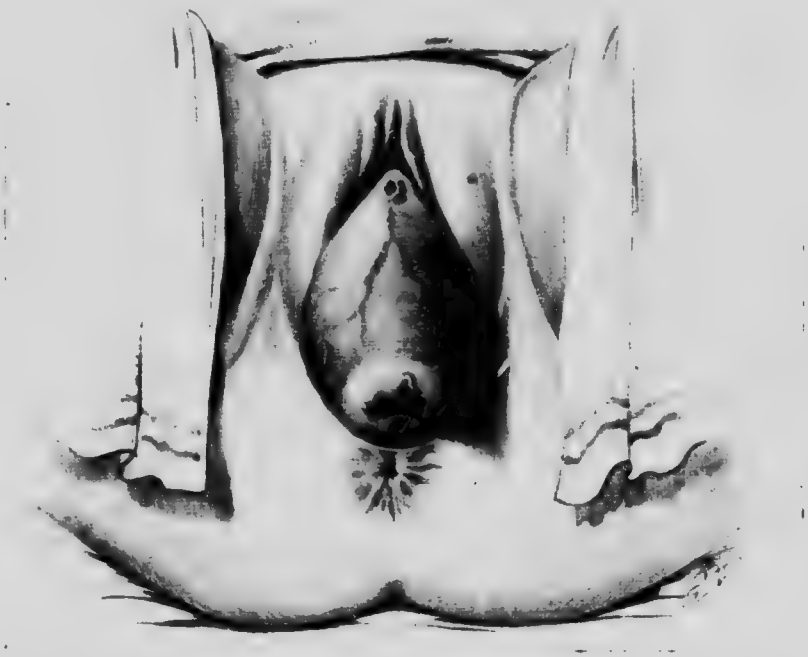


Fig. 53.—Third Degree of Prolapse of the Uterus: Procidentia Uteri. Vaginal walls completely everted. Note the small ulcers, the result of rubbing.

essentially belong to prolapse, but it occurs so commonly in connection with slight cystocele that this place appears to be the proper one in which to mention it.

When the uterus lies outside covered by the everted vaginal walls, naturally the protruding mass becomes a source of great discomfort to the patient. The mass becomes rubbed and ulcerated by the pressure of the thighs, and often small hæmorrhages occur. The skin of the thighs becomes chafed, as it is never quite dry, and so adds to the patient's discomfort. Constipation is often a great trouble, especially in cases of rectocele, the rectum being unable

to empty itself, owing to the weakening of its walls at the site of the protruding pouch.

As a rule menstruation is unaffected by prolapse, and an excessive flow is uncommon. It will be shown later that this is quite otherwise in cases of retroversion and retroflexion.

Diagnosis.

The diagnosis of uterine prolapse seldom presents any difficulty. It is to be made by inspection of the vulva, and by bimanual examination. A cystocele of any size is easily seen to protrude between the labia when the patient strains. The same occurs with a rectocele under some conditions, but as a rule a rectocele is recognized by putting the finger into the rectum and noting that the finger passes forwards into the bulging rectal pouch. The descent of the uterus is estimated by noting first the position of the cervix, whether it is outside, just at the vulva, or well within the vaginal orifice; and then by noting the position of the fundus uteri and the length of the uterus on bimanual examination. The more elongation of the supravaginal cervix there is, the less the fundus will seem to sink into the pelvis. With no lengthening of the uterus, the position of the cervix is the index to the position of the whole organ. The obliteration and descent of the vaginal fornices, increasing in amount with the three degrees of prolapse, are only indices of the amount of descent of the vaginal attachments to the cervix, and may occur equally well with elongation of the supravaginal cervix without much descent of the whole uterus, as with descent of the uterus without cervical elongation.

The cervix always forms the apex of the descending uterus, and retroversion of the uterus always precedes its descent. Hence it follows that an anteverted uterus can hardly descend at all; or, in other words, when the uterus is anteverted there can be no prolapse.

Prolapse must be distinguished from polypoid growths protruding from the cervix, and from chronic inversion of the uterus. In both these latter instances the actual os uteri can be felt high up, encircling the narrow pedicle of a growth or inverted uterus, whereas in prolapse the os uteri always forms the apex, the lowest part, of the descending mass.

A cystocele can always be distinguished by the fact that a sound passed into the bladder can be felt in the protruding cystocele. A cystocele may be mistaken for a cyst between the anterior vaginal wall and the bladder or urethra, or a solid growth (fibroid) between the bladder and vagina may simulate a cystocele. In these cases a sound in the bladder will be separated from the examining finger in the vagina by the thickness of the cyst or solid growth (Fig. 54).

Elongation of the supravaginal cervix can be distinguished by the great length of the uterus as estimated by a bimanual examination, or as measured by the passage of the uterine sound under strictly antiseptic precautions.

There is a form of elongation of the cervix which is sometimes mistaken for prolapse, in which the vaginal portion of the cervix is elongated, commonly termed congenital hypertrophic elongation of the cervix. This can always be recognized by the fact

Fig. 54.—Cyst in Anterior Vaginal Wall, simulating a Cystocele.

that the elongation is all below the vaginal fornices, instead of above them as in supravaginal elongation. The cervix protrudes from the vaginal fornices for two or more inches in well-marked cases. These cases are always congenital malformations, and are never acquired. They are of importance because the os uteri lies so low in the vagina that a very slight degree of descent is all that is necessary to make the cervix protrude at the vulva. They may be discovered in virgins, in whom true prolapse is uncommon, and they may be a cause of sterility in married women (Fig. 56).

When there is any ulceration of the protruding mass, the result of rubbing and traumatism, the ulcers are sometimes mistaken for malignant growths. Traumatic ulcers are always shallow, with attempts at healing at the edges, and may be found on any part of the prolapsed mass, not necessarily at the os uteri. The ulcer has a rather soft base without marked induration, and is not friable.

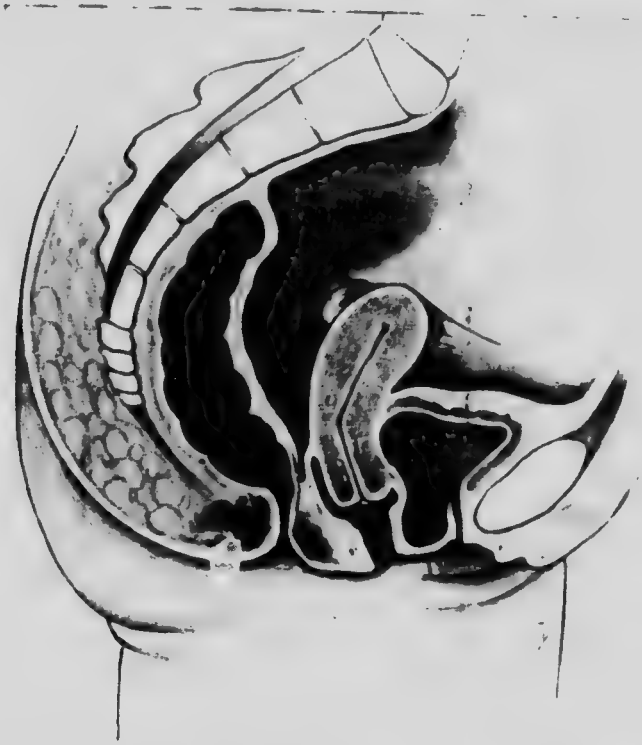


FIG. 55.—CYSTOCELE WITH ELONGATION OF THE INTERMEDIATE PORTION OF THE CERVIX.

A somewhat unusual condition in which the intermediate portion of the cervix has become elongated—*i.e.*, that portion which lies between the levels of attachment of the vagina in front and behind.

Squamous epithelioma of the cervix is distinguished by its friability and hardness, its hard, rolled, and everted edges, and its sloughing base. Squamous epithelioma of the vagina is a very rare primary growth, and has the same characters.

RESULTS.

The results of prolapse are of importance because the chief symptoms often depend on them, rather than on the actual descent.

Apart from the troubles of micturition, constipation, and backache, there are also anatomical results which cannot be overlooked, and which may have far-reaching effects. The gradual descent of the peritoneum of Douglas's pouch is important, and is a practically incurable result of prolapse. The ulcerations which occur on the protruding cervix and vaginal walls may be important sources of septic infection. Residual urine in a cysto ele, with its possible consequence of a cystitis, has already been mentioned.

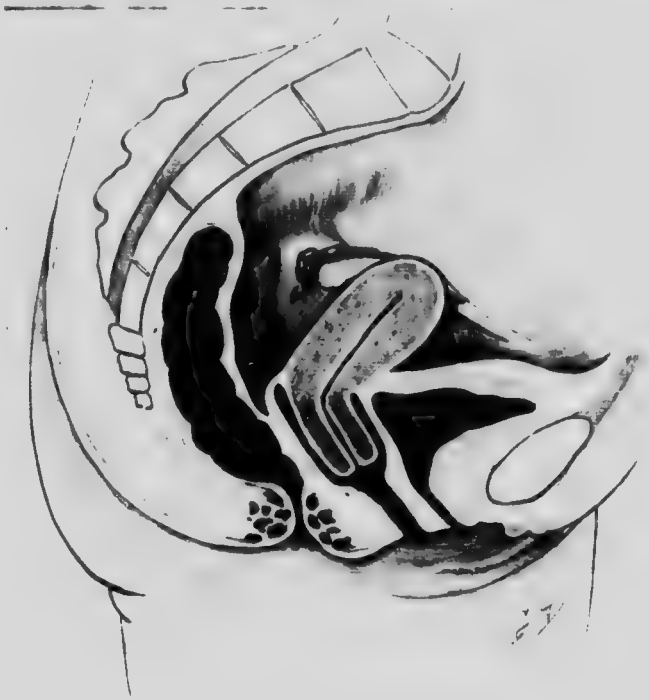


FIG. 56.—CONGENITAL ELONGATION OF THE VAGINAL PORTION OF THE CERVIX.

TREATMENT.

The length of time during which a prolapse has existed, as well as the secondary symptoms associated with it, will to some extent determine the treatment necessary, apart from the severity of the actual descent. In general, it is a fact that prolapse is a progressive lesion, even when treated by palliative methods, tending to get worse as time goes on.

At the same time there are certain cases which can be regarded as acute, and in them there is a possibility that the progress of the

lesion may be arrested by appropriate treatment. These are the cases in which prolapse begins to manifest itself soon after the birth of a child, when it is especially associated with subinvolution of the uterus and its supporting structures. In such cases there is usually a history of a protracted lochial discharge, the convalescence has been prolonged, and on examination the uterus is found to be enlarged, heavy, softened, and gradually descending towards the vulva, along with a cystocele of minor proportions. In such a case, as long as there is not a very pronounced injury to the pelvic floor, as evidenced by a large tear of the perineum, such as would require an operation for its repair, there is some hope of arresting the descent of movable parts of the pelvic floor by palliative means. The treatment has to be directed towards the completion of involution, and the toning up, not only of the uterus, but also of the uterine ligaments and the perivascular sheaths attached to the uterus and the bladder. To do this, the movable parts of the pelvic floor must be supported by vaginal tampons of absorbent wool soaked in pure glycerin and renewed daily, hot douches being used at the time of renewal, plain water being used in large quantities at a temperature of from 110° to 115° F. The vaginal tampon must be large enough to distend the vagina, and so keep the uterus and bladder in place, whilst pressure is made upon the perineum from without by means of a shaped pad kept on by a T bandage fastened to a belt outside a straight-fronted corset. The use of glycerin tampons is recommended because they tend to reduce congestion of the pelvic organs, by causing a flow of watery discharge from the cervix, and at the same time act as a support. Internally, the administration of full doses of liquid extract of ergot (1 drachm three times a day with dilute nitrohydrochloric acid, 10 minims) will keep up uterine contraction, again reduce congestion, and, by promoting the normal blood-flow through the uterine muscle, will lead to complete involution.

Calcium lactate in half-drachm doses (see p. 217) should also be given every other night along with the ergot, whether the patient is suckling the baby or not.

Whilst using this treatment, the patient must avoid any strain that would increase the abdominal pressure. Thus, the bowels must be kept acting easily, a cough must be relieved, and hard work must be strictly avoided. At the same time it is useless to keep the patient altogether lying down. The circulation and muscular tone will be best restored to normal if the patient has a moderate amount of exercise, and rests during certain hours of the day.

The length of time that this treatment must be kept up varies with each case, and also with the degree of success attending it.

A month is usually sufficient in a favourable case; but there is no harm in carrying it on for two months, if it seems to be doing good. If there is not a decided improvement in two months, it is hardly likely to be of any use to continue the treatment, because by that time involution will be as complete as it is likely to be.

If for some reason the glycerin tampon treatment is not tolerated by the patient—and it must be admitted that it is irksome and troublesome to carry out satisfactorily—then a ring pessary may be used as a temporary means of supporting the pelvic floor structures whilst involution is being completed. It is important to remember that the use of the pessary here is temporary, and is destined to be discontinued as soon as possible. When a pessary is used, it is advisable to douche with some astringent, such as alum, instead of plain water, so as to prevent infection of the vaginal walls.

It is comparatively uncommon, however, to see patients thus at the very commencement of a prolapse. As a rule they do not present themselves for treatment until some months after delivery, when the baneful effects of subinvolution have become permanent as far as the pelvic connective tissue is concerned, although the uterus may have regained its normal size, and may show no signs of chronic congestion, as evidenced by such a symptom as menorrhagia. Now the prolapse is a permanent condition and may have reached any of the three degrees described, and may be accompanied by cystocele, rectocele, or both. It is clear that the treatment will have to be either palliative or operative according to the merits of the case.

In the vast majority of cases there is a cystocele, the cervix uteri descends to the vulva on straining, and there is more or less deficiency of the perineal body, as an outward and visible sign of an injury to the pelvic floor. If it is agreed that the treatment is to be palliative, the patient must be made comfortable as far as possible by supporting the prolapsed structures by a suitable pessary. The question will always arise, why cannot such cases be cured outright by operations, and so obviate the necessity for the use of pessaries, which are always objectionable? The answer to this is, as long as a patient can be made really comfortable by a pessary, she will avoid an operation; and she cannot be blamed for doing so, and the surgeon is certainly not always well advised to urge it. There is no doubt that properly carried out plastic operations will be most successful in the early stage of prolapse. It must not be forgotten, however, that there is always a probability, if the patient is young, that further pregnancies will occur, and that the good accomplished by a plastic operation will be undone by a future delivery. This does not of necessity follow, but it is very likely to occur.

Further, a prolapse of the second degree, properly supported by a pessary, is unlikely to get rapidly worse; and so the patient may go on through the child-bearing period, and then, if necessary, have a plastic operation done when it is improbable that further pregnancies will occur.

There is one type of case which forms an exception to this line of treatment: that is the case in which there has been an injury to the perineum, which either has not been sutured or has failed to heal, and is of such a magnitude that it leaves a relaxed vaginal orifice, so wide that a pessary cannot be retained in the vagina. In such a case it is clear that the movable structures in the pelvic floor cannot be adequately supported by ordinary pessaries, and consequently a plastic repair operation must be performed. It must be an axiom in such a case that any operation which is done must aim at curing the prolapse without the future use of a pessary, and must not simply be a repair of the perineum to enable the patient to retain a pessary. When it has been decided to treat a case by a pessary, the form of the pessary must be decided upon. Although the number of pessaries which have been invented for the treatment of prolapse is legion, the only one of practical utility is the ring pessary. This is usually made of solid rubber upon a basis of watch-spring. It is best made with nine turns of watch-spring, so that it is sufficiently rigid to keep its circular form when any pressure is put upon it if the patient strains. The common form of ring pessary, made with only three turns of watch-spring, is too soft and pliable for use in many cases. When the patient strains, a soft pliable ring will be compressed into an ellipse, and will then be expelled from a vagina. The stronger spring will enable the ring to keep its shape, and therefore will be retained *in situ*; at the same time it will not be so rigid that it cannot be compressed by the surgeon's fingers for purposes of introduction.

Before putting in a ring pessary, the uterus should be carefully replaced in the anteverted position. The ring should be dipped in boiling water for a few seconds, to soften the rubber and sterilize the surface, and is then grasped by the thumb and forefinger of the right hand. It is then compressed into an ellipse and introduced into the vagina, with its diameter parallel to the antero-posterior line of the vulva, the left hand meanwhile separating the labia. When at least two-thirds of the circumference of the pessary is introduced, the ring is allowed to expand, and as it slips into the vagina the thumb and finger turn the ring round, so that its diameter now lies at right angles to the antero-posterior line of the vulva, as shown in Fig. 65. The forefinger is then pushed through the ring, and its

upper part is pushed upwards and backwards, so that it comes to lie in the posterior fornix behind the cervix, which in its turn projects through the ring. The size of ring to be chosen depends upon the capacity of the vagina, and some experience is required to judge how large a ring should be used. The essential point is to use the smallest ring which will make the patient comfortable and will stay in the vagina when the patient strains. A properly fitting ring should not stretch the vaginal walls like a drum, but should leave them slightly lax so that a finger can be passed round without causing pain. If too large a ring is used, the tensely stretched vagina soon becomes painful, and the pessary will have to be removed. Further, too large a ring causes injury to the vaginal mucous membrane, and infection will inevitably occur, setting up a troublesome catarrhal inflammation. When wearing a ring, the patient must be instructed to use a vaginal douche once a day, partly to wash away any discharge, and partly to prevent vaginal infection. In addition, the pessary should be removed at least every three months for cleaning purposes or renewal. If a severe vaginal discharge is set up by the ring (as sometimes happens even with properly fitting pessaries), the ring should be removed for a week or two and astringent douches used night and morning. Possibly, in such a case, a rather smaller ring can be afterwards used.

It is clear that ring pessaries will not often be of much use in cases of prolapse of the third degree, because there is, as a rule, so much relaxation of the vaginal outlet that no ring pessary will stay in, however hard and incompressible it may be. In an occasional case an incompressible vulcanite ring may be used, and may be combined with the use of a perineal pad and bandage to keep up some pressure and enable the pessary to be retained. The objection to incompressible rings is that they are difficult and painful to introduce unless the vaginal entrance is very much relaxed. In prolapse of the second and third degree, when ring pessaries are useless, because of the relaxed vaginal outlet, the question of a trial of some other form of pessary instead of operative treatment may have to be considered. This may especially be the case in elderly women, in whom, perhaps, operations are inadvisable on general grounds; also it may happen that the patient has a rooted objection to an operation, and may refuse to have one performed. In such a case there is no objection to making a trial of one of the cup and stem pessaries or of their modifications. These instruments essentially consist of a vulcanite stem about 4 to 5 inches long, terminating in a small ring, cup, or oval loop, of vulcanite, and having four rubber bands attached to the lower end. The stem is introduced so that

the ring, cup, or loop, supports the cervix and vaginal fornices, the four rubber straps, two in front and two behind, being fastened to a belt outside the corsets, so as to hold the stem tightly in place. The objection to these instruments is that they are difficult to adjust satisfactorily, so that they do not, on the one hand, exert injurious pressure, or, on the other, are not so loose that a cough or a strain will expel them. They are particularly troublesome in stout patients. Another form of pessary which at one time was much used is that known as the "butterfly." It consists of a stem with a couple of folding wings at the upper end, which can be made to expand at a hinged joint by means of a screw. Introduced with the wings folded, when expanded the wings rest upon the paravaginal tissues, and will sometimes remain in place in cases in which rings are useless. These pessaries cannot be recommended except to the most intelligent and careful patients, because they must be removed every night and replaced in the morning. If left in the vagina for any length of time, they are apt to set up ulceration, which may eventually spread through into the bladder, causing a vesico-vaginal fistula. This very serious injury has occurred often, but is not a sufficient cause for utter condemnation of the instrument if the patient can be kept under observation and will promise to take out the instrument every night. Numbers of women have been kept comfortable for years with these pessaries without any accident occurring.

Operative Treatment.

When pessary treatment is useless or the patient objects to wearing a pessary, operative treatment must be carried out. Now, when operation is to be done for the cure of a prolapse, it must be of such a nature and so effectually carried out that the patient will afterwards be enabled to dispense with any artificial support. If a patient has to wear a pessary after an operation for prolapse, that operation must be regarded as a failure. If the operation is a simple perineal repair to enable the patient to wear a pessary, the patient may be no better than she was before, as regards symptoms, although the uterus and cystocele may be apparently well supported. There is no doubt whatever that properly planned plastic operations will cure prolapse, and will restore the relationships of the pelvic floor structures so that pessaries can be dispensed with. To obtain this result, however, the operations must be very thorough, and must be based upon certain principles, without which the result is bound to be a failure. It must be recognized that any prolapse operation must aim at curing all the anatomical lesions, except, perhaps, the downward displacement of the peritoneum of Douglas's pouch. Cystocele

must be obliterated and the bladder adequately supported; rectocele must be obliterated and the rectum kept in its place by reconstruction of the recto-vaginal septum; the pelvic floor aperture must be narrowed; the perineum must be restored; the cervix must be amputated if there is an undue elongation of its supravaginal portion; and, finally, the uterus must be kept in an anteverted position. To perform all the necessary operations for these desirable ends means a prolonged operation if done at one sitting. It can, however, be quite easily done by any operator who has sufficient dexterity and quickness, and, fortunately, these operations are not attended by shock or great blood-loss. The best way to perform these operations is in the following sequence: First the amputation of the cervix, carrying the separation of the bladder in front as high as the normal situation of the internal os, and then suturing the vaginal mucous membrane to the mucosa of the cut cervical canal. Next a large anterior colporrhaphy must be combined with the amputation, taking care that the connective tissue on either side of the cervix and vagina is taken up in some deep, buried sutures so as to form a strong buttress before bringing together the cut vaginal mucous membrane. Then a posterior colporrhaphy combined with perineorrhaphy, commencing as high up the posterior vaginal wall as may be necessary, sometimes even in the posterior fornix. In performing this part, deep sutures must be put in to bring together the pararectal tissues above, and the two halves of the levator ani must be sutured together behind before completing the perineorrhaphy.

If it is found necessary to perform some operation to keep the uterus anteverted, an intra-abdominal operation is recommended. If the patient is in the child-bearing period, Gilliam's operation of shortening the round ligaments efficiently rectifies the malposition of the uterus, and is by many performed in preference to any form of ventro-fixation or ventro-suspension. The objections to ventro-fixation are not so great after the menopause is passed, and it may then be substituted for Gilliam's operation, but certainly not during menstrual life. If an intra-abdominal operation is deemed necessary, it may be wise to perform it some time after the vaginal plastic operation, thus completing the operation in two stages. This, however, naturally must depend on the nature and extent of the vaginal operations and the general condition of the patient; if they can be done in a short time satisfactorily, and the patient is in good condition, there is no objection to performing the two steps of the operation on the same day, naturally using freshly sterilized instruments and gloves for the abdominal portion. Whilst the abdomen is open, if thought advisable, the very deep pouch of

Douglas may be obliterated, by inserting sutures between the rectal and vaginal portions. If the modern vaginal operations are thoroughly carried out there will seldom be any necessity for an abdominal operation.

After prolapse operations the patient should be kept in bed for at least three weeks, and then should be kept lying on a couch for another three weeks before being permitted to walk about. In this way the newly constructed septa and buttresses will have time to consolidate, and will not be so likely to stretch when any strain is put upon them.

CHAPTER XVIII

RETROVERSION AND RETROFLEXION OF THE UTERUS

Although retroversion may occur without retroflexion, they are so commonly found together that it is convenient to describe them thus. By the term retroversion is meant a backward rotation of the uterus around a transverse axis at the level of the internal os (Fig. 57).

By retroflexion is meant a backward bending of the uterus at the level of the internal os or a little higher, so that the concavity of the uterine axis, instead of being forward, is directed backward.

It must be realized that every degree and variety of these displacements can exist, as shown in Fig. 44, from the simplest degree of retroflexion to the most complete backward rotation plus backward bending, which constitutes the extreme degree of retroversion plus retroflexion. These conceptions of backward displacements, it will be seen, are all considered in the relation of the uterine axis either to the vertical line of the body (retroversion) or with regard to the bend of the uterine axis on itself, normally forwards (anteflexion), pathologically backwards (retroflexion).

Strictly speaking, every degree of retroversion can occur by itself, the uterus always maintaining its normal anterior concavity. Retroflexion of the uterus practically never occurs alone, but always accompanies retroversion. Further, to speak quite strictly, retroflexion is not really a displacement of the uterus at all, but is an acquired malformation of the curve of the uterine axis.

Under normal conditions the uterus undergoes periodical changes of position according to the emptiness or distension of the bladder. When the bladder is empty, the uterus occupies a position of extreme anteversion with regard to the vertical line of the body. As the bladder becomes distended, the uterus is raised to the vertical position, which is strictly a minor degree of retroversion, and then slips to one side or the other, usually to the right, without further backward rotation.

When, however, a backward displacement is permanent, without any regard to the condition of the bladder, it must be regarded as pathological.

Cause.

Congenital Backward Displacement.—The first fact which stands out in any investigation of the causes of backward displacements is the large number of cases in which the uterus is found to be retroverted, with or without retroflexion, in virgins or in married women

Fig. 57.—Retroversion of the Uterus: Three Stages.

who have had no pregnancies. In such cases the common factors, which, as will be shown, are the causes of backward displacements, are not present, and never have been, and consequently it is usually believed that these displacements are congenital. This is probably not strictly true, but it is difficult to find a better term for them: the fact is, rather, that these displacements are acquired early in life, during the process of growth and the onset of maturity.

There are some significant points which bear out these views. It is a common experience to find that a retroverted uterus in a

virgin is small and badly developed; it is often associated with a short posterior vaginal wall, suggesting that the posterior vaginal wall has not grown, owing to the abnormal direction of the cervix, making the levels of the anterior and posterior vaginal wall attachments equal. It is associated with scanty and painful menstruation, but gives rise to no other symptoms, and finally it may be associated with sterility; but if pregnancy occurs, abortion is likely to occur at about the sixth week. These points rather suggest that the retroversion and flexion of virgins, commonly called "congenital," must be regarded more in the light of a malformation than as a true displacement.

On the other hand, if one of these uteri becomes infected, or becomes congested from some other cause, symptoms will follow which are exactly the same as the symptoms usually found in acquired backward displacements. It is convenient, therefore, to classify backward displacements as congenital or acquired.

Acquired Backward Displacement.—The causation of acquired backward displacements is clear enough as a rule, for most of them can be traced to a pregnancy, and follow either delivery at term or abortion. When it is said that they can be traced to a pregnancy, what is strictly meant is that the symptoms which draw attention to them follow delivery or abortion. Naturally, it is impossible to say that any given uterus was not retroverted before pregnancy occurred, unless an examination had previously been made and the condition discovered then. Even if the case had originally been one of congenital retroversion, the development of the symptoms of an acquired displacement after delivery bring it into the category of acquired displacements.

The part played by pregnancy, abortion, or full-time delivery, in the causation of backward displacements, is clear, and is largely the result of the dorsal position so constantly assumed by women during the lying-in period.

Fig. 58 shows the sequence of events which may happen during the puerperium if the patient constantly lies on her back. The enlarged, heavy involuting uterus rests at first upon the sacral promontory, but as it gets smaller it tends to fall back below this point into the hollow of the sacrum. If it does this, as an inevitable result the small intestine must lie upon the anterior wall of the uterus, and any straining effort will therefore push the fundus uteri lower down, and tilt the cervix correspondingly forward. In turn this displacement leads to congestion of the uterus, and involution takes place slowly and badly, resulting in a softening of the uterine muscle. When the patient gets up, it is a pure accident

whether the uterus remains retroverted or is tilted forwards into its normal position. If it remains retroverted, the intra-abdominal pressure as transmitted by the intestines to the anterior wall of the uterus, now soft and pliable, but to some extent held up at the level of the internal os by the lateral cervical ligaments, will bend the fundus backwards in addition to the backward rotation it already has. Thus a retroflexion is produced as well as a retroversion.

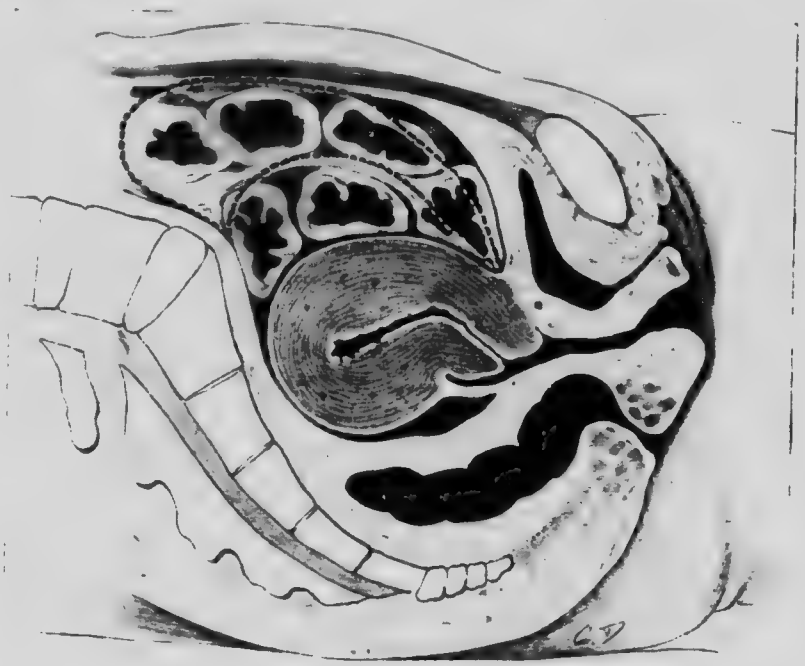


FIG. 58. TO SHOW HOW THE UTERUS MAY GRADUALLY BECOME RETROVERTED AND RETROFLEXED DURING THE PUERPERIUM.

The dotted lines represent the upper limit of the uterus at different stages of involution.

Whilst involution is slowly completed, the backward bend is gradually made permanent, and the retroflexion, though the uterus retains its mobility, is also persistent. Although this accident commonly follows full-time delivery, yet it may follow abortion in the early months for precisely the same reasons. It is thus seen that, unlike prolapse, pelvic floor injuries and relaxed ligaments play no important part in the causation of backward displacements, although no doubt these factors contribute something to the ease with which the above-mentioned sequence of events occurs. Pelvic

examinations in large numbers of lying-in women have given abundant proof that this is the common, if not the only, cause of any importance of acquired backward displacements.

Apart from displacement by tumours (Fig. 60), it is very doubtful whether any other cause exists, but it is believed that a small number of cases occur apart from parturition. In them chronic over-distension of the bladder, pelvic inflammation, and common accidents, have been described as the causal factors. A woman who constantly

Fig. 59.—Retroversion and Retroflexion of the Uterus fixed by Adhesions to the Rectum and Sacrum.

neglects to empty the bladder at sufficiently frequent intervals must have her uterus retroverted for a considerable part of the time, and it is quite a chance that, sooner or later, a piece of small intestine will insert itself between the fundus uteri and the bladder, and thus transfer the intra-abdominal pressure from the posterior to the anterior wall of the uterus. Thus, when the bladder is emptied, the uterus may be kept retroverted by the intra-abdominal pressure.

If the patient is ill-nourished and has very little fat, the uterine supports may be weak, and this will be an additional factor in

rendering displacement easy. If a patient has a pelvic peritonitis, secondary to an inflamed tube and ovary, a mass of exudate forms between the rectum and the uterus which eventually coagulates, and then is partly absorbed and partly organized into fibrous adhesions. Finally these adhesions shorten as cicatrization proceeds, and gradually draw the fundus backwards towards the rectum. It is, however, a much more frequent occurrence that these adhesions form between a uterus which is already retroverted and the rectum (Fig. 59).

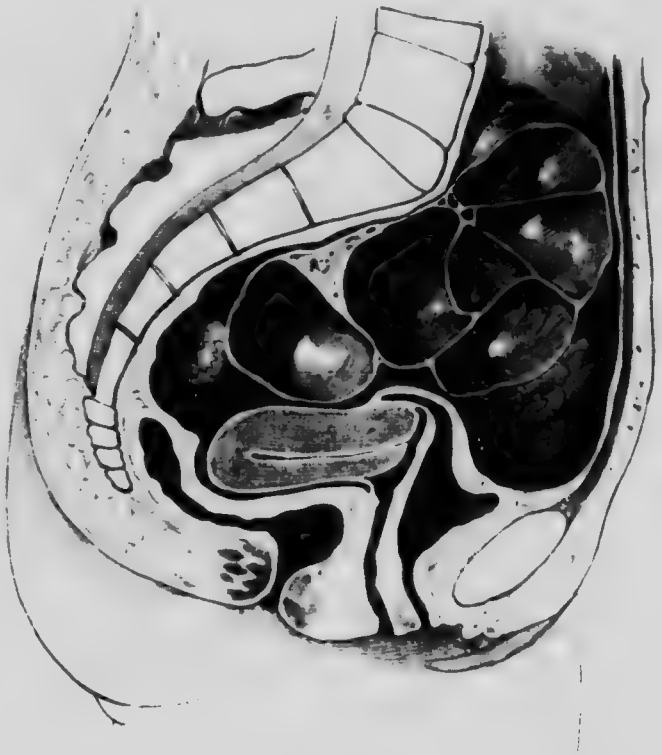


FIG. 60.—UTERUS PUSHED DOWN AND RETROVERTED BY A MULTILOCULAR OVARIAN CYST.

With regard to common accidents, such as falls, blows, overreaching, etc., which are so often regarded by women as the cause of their displacements, grave doubt exists whether such results are possible. To prove that a uterus has become retroverted as a result of an accident, it would be necessary to have previously examined the patient and to know that the uterus was not already retroverted. This has never been satisfactorily shown in a given case. If a uterus can be retroverted by an accident, its natural

resiliency and mobility, in normal circumstances, will allow it to be just as easily anteverted by some movement. It can hardly be believed that a permanent retroversion can be induced by a common accident, unless some actual tearing of the supports occurred, and the intestinal pressure became permanently transferred from the posterior to the anterior surface of the organ. Seeing how common congenital retroversions are, a claim for damages against an employer, by a person who has a displacement alleged to be the result of an accident, could not be sustained unless it was known, from an actual examination, that the uterus was in its normal position before the accident took place.

Pathological Anatomy.

It is important to realize what effects may follow backward displacements, as far as the endometrium and muscle coats are concerned, as well as the effects upon the ovaries and Fallopian tubes. The latter are easily demonstrated, whilst the former are somewhat obscure and open to discussion.

Effects on the Endometrium and Muscle Coats.—There is no doubt that the symptoms commonly complained of in acquired cases are the same as those of endometritis and uterine congestion generally, and therefore it is necessary to demonstrate, if possible, how a retroverted uterus can develop endometritis or become congested. It must be borne in mind that these conditions may have been present before the displacement occurred. Of the two propositions mentioned, to take the latter first, a retroverted uterus may become congested because there is interference with the venous return in the broad ligaments. The backwardly directed fundus necessarily carries the broad ligaments with it, and folds them over backwards. This implies some slight twisting of the vessels in the mesometrium, which will flatten the veins without affecting the arteries. It is also believed that the broad ligaments become squeezed against the utero-sacral ligaments on either side, again with flattening of the veins. This, however, a very old view, is not quite so certain, but may occur in those cases in which the fundus uteri is said to be incarcerated and held down between the utero-sacral ligaments. There can be no doubt that long-continued congestion will lead to thickening of the endometrium and degeneration of the muscle coats, with increase of the fibrous stroma. Consequently endometritis and the so-called metritis may develop with their usual symptoms.

On the other hand, it is more than probable that many of these

cases are really instances of the results of a slight septic infection following labour or abortion. These slight infections are common enough, and have the same effect upon the endometrium and muscle as chronic congestion. Likewise these infections may be contributing factors to the actual displacement, by leading to subinvolution, relaxation of supports, and the softening of the muscle coats, which all help to produce versions and flexions.

Effects on Fallopian Tubes and Ovaries.—The backwardly directed fundus must alter the position of the Fallopian tube and ovary, owing to the folding of the broad ligament. This leads to descent of the inner end of the Fallopian tube and of the ovary, and by a gradual process of lengthening of the whole broad ligament the ovary and tube eventually come to lie in Douglas's pouch, either below or on either side of the fundus uteri. Naturally, every degree of this "prolapse" of the ovary and tube can occur. In extreme cases the ovary sooner or later becomes congested, a little enlarged, and harder than normal from chronic areolar hyperplasia, so that symptoms referable to the ovaries may possibly arise.

Almost every case of acquired backward displacement shows at some time a condition of catarrhal inflammation of the cervix or a cervical erosion. This is always the result of infection, no doubt primary in many instances, but in some possibly secondary, owing to a diminished resistance to bacterial infection because the organ is congested and œdematous. In very long-standing cases with an acute backward flexion, there is some thinning of the anterior uterine wall opposite the bend. This is not of any very great significance, but has some bearing on the practical impossibility of curing the flexion apart from a radical operation.

Symptoms.

Care must be taken not to ascribe all symptoms complained of to a retroverted uterus, because many such cases have no symptoms, and in others the symptoms persist in spite of replacement.

It seems highly probable that those symptoms complained of, which are so often found associated with backward displacements, are really the result of the secondary changes in the endometrium and uterine muscle, and are not really caused by the displacement *per se*. In the congenital cases there are often no symptoms, but if the uterus becomes infected or congested the usual symptoms are acquired. Thus, it will be shown that the common symptoms are really those of endometritis, endocervicitis, cervical erosion, and deficient muscular support, with, in addition, symptoms which are referable to the prolapsed and congested ovaries.

It is not at all uncommon to meet with acquired backward displacements in which there are no symptoms. It must follow, from what has been said above, that in such cases there is no congestion or infection of the uterus, and no marked change in the position of the ovaries. Also it sometimes occurs that symptoms which were once present have gradually become relieved, probably because the uterine circulation eventually becomes adjusted to the altered conditions and there is no actual infection.

The common symptoms associated with backward displacements are: Backache (usually referred to the upper part of the sacrum), bearing-down, menorrhagia, dysmenorrhœa, sterility, leucorrhœa, dyspareunia, and chronic left-sided pain referred to the so-called ovarian region between the umbilicus and anterior superior iliac spine.

Backache is a common result of uterine congestion, and may be contributed to by some dragging on the uterine supports, just as it is in prolapse.

Menorrhagia and dysmenorrhœa are the direct result of congestion of the endometrium, with subsequent thickening, and of the congested uterine muscle and badly controlled blood-supply (see Endometritis).

Leucorrhœa is the result of a cervical catarrh, practically always due to infection, but is also augmented by the watery secretion from the body of the uterus.

Dyspareunia in these cases is always caused by the disturbance of prolapsed tender ovaries during coitus, or by the stretching of adhesions. Incidentally this symptom may be very distressing and the most important indication for operative treatment.

Signs.

Inasmuch as the symptoms are always the result of secondary changes, a backwardly displaced uterus can never be diagnosed without an efficient pelvic examination. It has no pathognomonic symptoms of its own. On abdominal palpation, as a rule, nothing abnormal will be found. On vaginal examination, the first thing noticed is that the cervix is lower down than usual, and that it is directed down the vaginal canal instead of backwards. When there is more retroversion than flexion, the cervix may actually point horizontally forwards, or even upwards towards the upper part of the symphysis pubis.

At the same time, on making a bimanual examination, it will be noticed that the fundus uteri is not directed forwards or lying upon the bladder. The fingers of the two hands can be made to

meet in front without encountering the fundus. Then, on pushing the vaginal finger up into the posterior fornix, the body of the uterus will be found directed backwards. Its continuity with the cervix can be traced, and, on raising the whole uterus with the fingers beneath the cervix, the body can be palpated bimanually.

In acquired cases with symptoms, the uterine canal will be found elongated and the body enlarged in all directions, and softer than usual from general œdema. When the ovaries can be palpated, they may be found at abnormal levels, as rounded tender bodies by the side of the fundus, or even beneath it in Douglas's pouch. If the ovaries have been long congested, they will be harder than normal and a little enlarged, which makes them much easier to feel than normal ovaries.

The mobility of the uterus is to be tested by raising the fundus with one or two fingers pushed up into the posterior fornix. The fundus may be immovable or difficult to raise for two reasons: either because it is fixed by organic adhesions to the rectum or Douglas's pouch, or because it is incarcerated between the two utero-sacral ligaments. In the latter case there are no adhesions, and the fundus can usually be raised by one of the manœuvres to be described under "replacement."

The presence of adhesions cannot always be diagnosed with certainty, but it must be borne in mind that adhesions cannot occur without an antecedent pelvic peritonitis, so that there will always be a history of some illness, with abdominal pain and confinement to bed. Immobility of the uterus in spite of the use of the vulsellum, with the bimanual method of replacement, or forward dragging of the rectum when the uterus is raised from the vagina, are the most certain signs of actual adhesions between the fundus and surrounding organs.

Tenderness on pressure upon the retroverted fundus frequently means prolapsed tender ovaries, even though these cannot actually be palpated; but the uterus is often tender, especially if adhesions are present. In cases accompanied by inflammation of the Fallopian tubes and ovaries, there will always be found a mass in the pelvis, of indefinite size and shape, quite different from the feel of the unaltered fundus uteri.

Diagnosis.

Although there is seldom any difficulty in recognizing a retroverted uterus, there are a few conditions which simulate it, and which must not be overlooked. The most common mass felt through the posterior fornix is fæces in the rectum. An interstitial

fibroid in the posterior uterine wall will be felt through the posterior fornix by the finger, but at the same time the fundus uteri will be felt in front in its usual position on bimanual examination. The finger will serve to differentiate this, and it is not necessary to have recourse to the uterine sound to locate the cavity of the uterus. See Fig. 61.

Small masses composed of adherent tubes and ovaries lying behind the uterus in Douglas's pouch sometimes simulate retroversion

Fig. 61.—Fibro-Myoma in the Posterior Wall of the Uterus simulating a Retroversion.

and flexion. In such cases it may be extremely difficult to separate the uterus from the inflammatory mass on bimanual examination. The history of a severe illness, the great tenderness, and all the accompanying symptoms, will show, however, that there has been some actual inflammatory lesion, and that, whether the uterus is displaced or not, the symptoms are not those of a simple displacement.

Small ovarian tumours are occasionally found behind the uterus.

and simulate a backward displacement. Unless these are fixed by adhesions, it is usually possible to distinguish the uterus bimanually in front of the tumour, and so to make certain that there is no actual displacement.

Any other small pelvic tumour, such as a small hæmatocele, will give the same diagnostic signs. Obviously, the character of a small pelvic tumour cannot always be diagnosed with accuracy: but it will generally be possible to say that there is a tumour, and that the case is not one of simple uterine displacement. Rarely a carcinoma of the pelvic colon or rectum may form a mass which may be mistaken for a retroverted uterus.

Treatment.

It must be clearly recognized that there are many retroverted and retroflexed uteri which do not require any treatment, for the simple reason that they cause no symptoms. Many patients may have symptoms, which are really caused by digestive, intestinal, renal, or bladder troubles, which may themselves require to be relieved, but not by local uterine treatment. It is the duty, therefore, of the practitioner, who meets with a case of backward displacement of the uterus, to make up his mind whether it is really causing symptoms or not, and upon that decision will rest the choice of the treatment to be adopted. The sporadic congenital cases in themselves do not require treatment, but under some conditions they have to be considered. For instance, if a patient who has a congenital retroversion becomes pregnant, the uterus ought to be replaced at about the sixth or eighth week of pregnancy, and kept in place by a suitable pessary; otherwise abortion may occur. It does not always, because many such pregnant uteri right themselves spontaneously. If an abortion has once occurred in a person who has a retroverted uterus, advice must be given that she should present herself for treatment as soon as she knows herself to be pregnant again, or as soon as she has missed a monthly period: in that way a second abortion can often be avoided.

Further, these congenital displacements cannot be kept in place by any pessary, except in the pregnant condition. This is accounted for by the increased size and mobility of the uterus when pregnant. A congenital retroversion cannot be replaced and kept in place when not pregnant, because of the small size of the organ and the short posterior vaginal wall, even if it could be shown that replacement was desirable. It is also not desirable to attempt to replace a retroverted uterus in a virgin, when the lesion is causing no symptoms. The mere fact of wearing a pessary constantly draws

the patient's attention to her sexual organs, and is apt to induce a neurasthenic condition which is much worse for her than the actual displacement. In fact, it is an important question whether a virgin should even be told that she has a displacement, for the same reason; it is wise, however, to inform some near relative, so that the doctor shall not be discredited if some other practitioner eventually discovers the displacement and mentions it.

When, however, it is clear that a displacement is causing symptoms, whether it is acquired or whether it is a congenital one which has become infected or congested, then treatment must be adopted, and it will have to be decided whether the treatment shall be palliative or operative.

Palliative treatment consists of replacement of the uterus and keeping it in place with a suitable pessary.

Operative treatment means some form of fixation or suspension operation performed by the abdominal or vaginal route, so as to keep the uterus in place without the use of pessaries.

The choice of treatment depends first upon the mobility of the uterus, the possibility of its replacement, and the presence or absence of inflammatory lesions of the ovaries and Fallopian tubes. When the uterus is quite mobile, the ovaries are not tender or painful, and the vaginal outlet is sufficiently small to enable a pessary to be retained, then replacement and pessary treatment is indicated.

If, however, the uterus is mobile, but the ovaries are very tender, some counter-irritant treatment may be adopted to reduce the tenderness of the ovaries, before the uterus can be replaced and a pessary worn. If a pessary is used when the ovaries are very tender and prolapsed, however carefully the uterus is replaced, the pessary will cause pain and the patient will not be able to wear it. In some such cases, even if the uterus is mobile, some operative treatment is indicated, if counter-irritation does not so reduce the tenderness of the ovaries as to enable a pessary to be worn.

On the other hand, operative treatment is indicated if the uterus is fixed by adhesions, the ovaries are very painful and prolapsed, and dyspareunia is a marked symptom or pessary treatment has failed. In other words, an operation is required more on account of the pelvic inflammation and the serious disabilities which it produces than for the actual displacement, though the latter can and should be remedied at the same time.

When it has been decided that a backward displacement shall be treated with a pessary, the first absolute necessity is to replace the uterus completely to an anteverted position. There are two

safe ways to do this with the fingers, and one which is unsafe and unnecessary with the sound.

Replacement by the Sound.—This may be at once dismissed as dangerous, because it is a means of infecting the uterus, because it is liable to perforate the uterus, and because one cannot always be absolutely sure that the patient is not pregnant. There are numbers of cases on record in which acute infection of the uterus, Fallopian tubes, and ovaries, can be traced to the use of the sound for diagnostic purposes or replacement of a retroversion. There are still more cases in which the uterus has been perforated by a sound, and others in which abortion has been induced accidentally by the passage of the sound into a pregnant uterus.

FIG. 62.—REPLACEMENT OF A RETROVERTED AND RETROFLEXED UTERUS. FIRST STAGE: FINGERS IN THE VAGINA PUSHING UP THE FUNDUS.

Replacement by the Fingers.—As a general rule, it is best to have the patient lying on the side in the Sims position; it is possible to reach higher in this position than in the dorsal position. One or two fingers of the right hand are introduced into the vagina, and the manœuvre is started by pushing up the fundus uteri from the posterior fornix. It is best to push the fundus a little to one side of the middle line so as to avoid the promontory of the sacrum. Some assistance can be gained by pressing just above the pubes,

with the left hand on the abdomen, so as to depress the cervix whilst the fundus is pushed up. The vaginal fingers alternately also hook back the cervix and push up the fundus. By repeating these manœuvres, at last the outside hand is able to catch the fundus and help to tilt it forwards. Naturally, the ease with which this can be done depends upon the toleration of the patient, the size of the uterus, and the absence of painful congested ovaries. If the patient is intolerant, an anæsthetic may have to be used; but it must not be forgotten that intolerance may depend upon tender

FIG. 63.—REPLACEMENT OF A RETROVERTED AND RETROFLEXED UTERUS—SECOND STAGE: OUTSIDE HAND CATCHING THE FUNDUS AND ANTEVERTING IT.

prolapsed ovaries, in which case replacement is not always indicated. The size of the uterus is important, for, as a rule, the larger it is the easier will be the replacement. Very small uteri especially those which are called congenital, often cannot be replaced at all, and even if they can they do not remain in place.

If the uterus is movable, and yet cannot be replaced with the fingers, the volsellum forceps may be used as an additional help. The volsellum is fixed upon the anterior lip of the cervix uteri, using a Sims speculum to enable the os uteri to be seen. Then, by pulling the cervix downwards in the direction of the vaginal

canal, the uterus is straightened and the fundus is brought within easy reach of a finger in the posterior fornix. The fundus can then be tilted forwards whilst the volsellum carries the cervix backwards. This method never fails if the uterus is not fixed by adhesions; it is not very painful, and in general does not require an anæsthetic to be given. It has quite taken the place of the uterine sound for the purpose of replacement (Figs. 62, 63, 64).

When the uterus has been anteverted, then comes the question of the most suitable pessary to keep it in place. Two pessaries

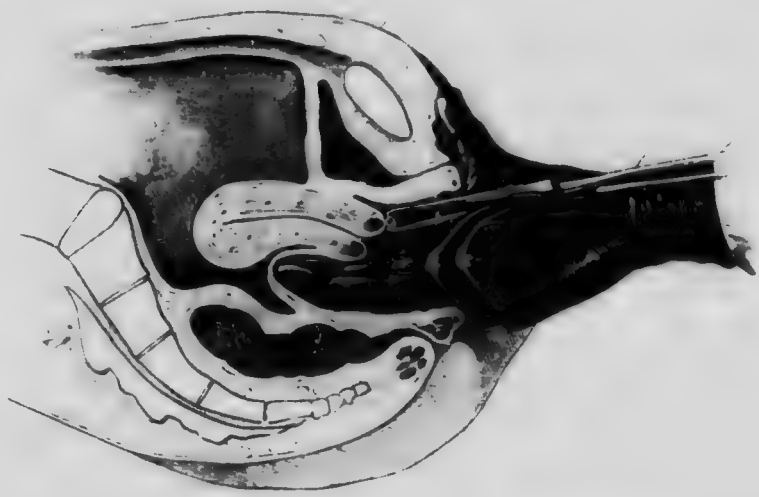


Fig. 64.—Replacement of a Retroverted and Retroflexed Uterus with the Fingers, aided by Traction on the Cervix with a Volsellum.

are in common use for this purpose: the rubber ring pessary, and the Hodge pessary or its near relation, the Albert Smith pessary. In general it may be said that the ring is the more useful, but it must be admitted that the Hodge is the more cleanly. The ring can be used in any case, whilst the Hodge can only be used when the vaginal orifice is narrow and not relaxed. There is no special mechanical action to be ascribed to either pessary. Each acts by distending the vagina and thereby putting the vaginal attachments of the uterus moderately on the stretch, and thus tending to make the uterus assume a position at right angles to the vagina. The ring pessary is made with a watch-spring covered with rubber, and the Hodge is best made of vulcanite. The form of the latter can be altered to suit any particular case by first boiling and then moulding the softened vulcanite with the fingers. The position of

these pessaries in the vagina is shown in Figs. 65, 66. It must be emphasized that the uterus must be replaced before the pessary is put in, and that the pessary by itself will not antevert the uterus.

Both pessaries are introduced in the same manner, but it should be remembered that the round end of the Hodge or Albert Smith pessary should be upwards in the posterior fornix. The pessary, whichever it be, is introduced into the vagina in a position at right angles to that which it will eventually occupy, and is turned round after introduction by means of a finger passed through it, and its

Fig. 65.—Ring Pessary in Situ.

upper end is hooked behind the cervix. The pessary should be the smallest which will accomplish the object in view, not the largest which the vagina will hold at any cost. When a pessary has thus been put in for a retroversion, the test of its efficacy depends upon the relief of the patient's symptoms. If pain and aches are relieved, if the patient is able to walk and sit in comfort, and if eventually menstruation becomes normal in quantity, it is clear that the pessary is doing good, and its use should be continued. If, however, the pessary does not relieve any symptoms, and this, unfortunately,

often happens, then it should be at once removed, as it is useless. In those cases in which pain and discomfort recur after some weeks of relief of the symptoms by a pessary, it is an indication that the uterus has again become displaced in spite of the pessary, and the process of replacement must be gone through again. Replacement as a rule becomes easier each time, but in many cases constant attention is required. In those cases of movable uteri with prolapsed tender ovaries, pessaries can rarely be tolerated or the uterus replaced until the ovarian tenderness has been reduced. This is

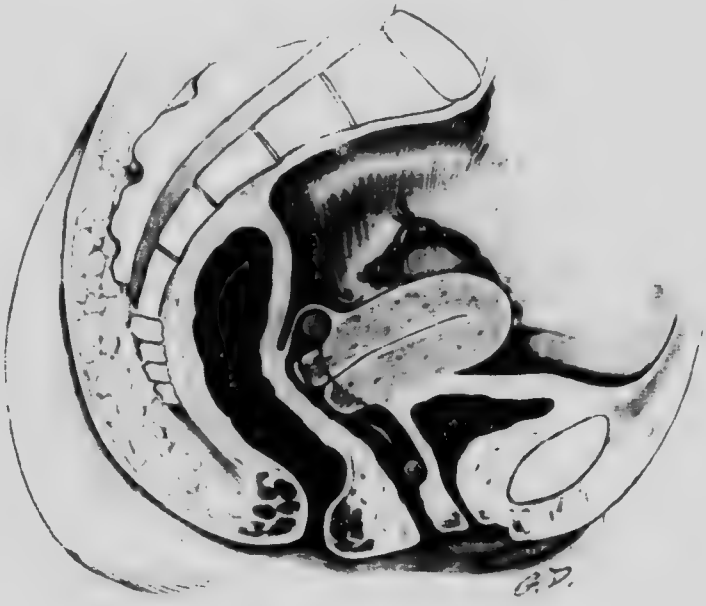


FIG. 66.—HODGE PESSARY IN SITU.

best accomplished by the use of hot vaginal douches, ichthyol or glycerin locally in the vagina, and bromide of potassium given by the mouth. The hot douches must be copious, given very slowly, and at a temperature as high as can be borne (as a rule about 115° F.). They should be given night and morning, salt solution being used.

Ichthyol is an excellent counter-irritant, as it causes a considerable flow of watery mucus from the cervix. It is best applied in the form of a vaginal suppository made up thus:

℞	Ichthyol	gr. xii.
	Cacao butter	gr. cxx.

To make one vaginal suppository.

The suppository should be pushed up the vagina until in contact with the cervix, and it should be used every other night after the hot douche. A vulval pad should be worn, as the melting of the cacao butter may allow some ichthyol to escape and stain the patient's clothing. The morning douche brings away mucus, remains of the suppository, and sometimes a cast from coagulation and destruction of the superficial layers of the vaginal epithelium.

If glycerin is used instead of ichthyol, the mode of action is much the same, as it causes a watery discharge from the cervix. It is used by soaking a lump of cotton-wool with glycerin until it is about the size of a golf-ball, tying a string round the wool, and pushing it into the vagina. The string is to facilitate withdrawal. It is not such a convenient method as the ichthyol suppository, but is cheaper and is easily improvised. It is found useful in practice to use the ichthyol for about a fortnight, then leave off for a week, and then repeat the process.

Internally a mixture such as the following will be found very useful:

℞	Potassii bromidi	gr. x.
	Ammonii carbonatis	gr. ii.
	Ferri et ammonii citratis	gr. v.
	Spiritus chloroformi	♏x.
	Aquam	ad ℥i.

Two tablespoonfuls to be taken three times a day.

If these measures result in relief of the ovarian tenderness, the uterus may then be replaced and a pessary inserted.

Operative Treatment.—The indications for operative treatment are clear and precise. They are present when the symptoms are such as to be a constant discomfort to the patient, and to make treatment of some kind imperative, and when pessaries fail to give relief. When there is great tenderness due to prolapsed ovaries, unrelieved by counter-irritant measures: fixation of the uterus with prolapsed tender ovaries: retroversion complicated by salpingo-oöphoritis and adhesions: severe dyspareunia from prolapsed tender ovaries: when repeated sterility is present or abortion has occurred.

The question of what operation should be performed has been much discussed, and many different procedures have been tried, all with more or less success. The oldest operation, that known as the Alexander-Adams, has been much used in the past, but is now seldom seen. It has great disadvantages, in that it is an extra-peritoneal operation and does not permit of any inspection or treatment of the ovaries or Fallopian tubes. Further, it may be difficult

to find the round ligament at the external abdominal ring, and sometimes, when found, it is so slender that it will not stand the pull which is necessary to shorten it sufficiently to keep the uterus anteverted.

The next operations were fixation methods, either through the vagina or by an abdominal incision, and for many years were largely used. Ventro-fixation aimed at fixing the anterior surface of the uterus to the anterior abdominal wall just above the bladder, with or without the parietal peritoneum intervening. If the uterus was stitched to the parietal peritoneum, a more or less movable organ was left, and the operation was called ventro-suspension. If sutured to the aponeurosis without any peritoneal intervention, then a true fixation resulted. The chief objection to the operation is the risk of difficult labour should the patient become pregnant. The risk is not a great one; but if the fundus uteri is absolutely fixed low down, expansion of the uterus during pregnancy can only take place at the expense of the posterior wall, which becomes dangerously thinned. The cervix also becomes drawn high up, even above the promontory of the sacrum. This has led to obstructed labour, death from rupture of the uterus, and in some recorded cases has required Cæsarean section to deliver the patient. These risks will not occur as long as the sutures are not placed in the fundus, but only about halfway up the anterior surface of the uterine body. Vaginal fixation, which is practically abandoned now, had the same disadvantages as ventro-fixation.

Naturally, the operation of choice will be that one which affords a complete means of inspecting the pelvic organs and dealing with them if diseased, which will keep the uterus in an anteverted position, and which, above all, will leave it a movable organ and capable of expansion should pregnancy occur.

Intraperitoneal shortening of the round ligaments by Gilliam's method or its modifications, fulfils all these desiderata, and at present must be regarded, without hesitation, as the best operation for the treatment of backward displacements.

CHAPTER XIX

DISPLACEMENTS *Continued*

ANTEVERSION AND ANTEFLEXION.

These terms are used to designate a condition of the uterus in which there is an unusual degree of anterior inclination (anteversion), or an unusual degree of anterior bending (antoflexion). They cannot be regarded as displacements, because they are only an exaggeration of the normal position of the uterus.

Cause.

Increased antoflexion occurs constantly in the first two or three months of pregnancy, when the lower uterine segment is softened and allows of an unusual amount of anterior bending, especially as the fundus uteri is enlarged and more heavy. The flexion is increased, too, by the intra-abdominal pressure, acting upon the back of the enlarged uterus and pressing it down upon the bladder. It is commonly believed that this pressure upon the bladder is the cause of the frequency of micturition so often seen in the early months of pregnancy. It is by no means proved that this is the case, and it is quite possible that there may be some other cause, such as the presence of an unusual urinary constituent which irritates the bladder mucous membrane. It is a fact that the frequency of micturition is commonly cured by giving large doses of potassium citrate, which would hardly be expected if pressure was the primary cause.

An undue antoflexion is very often a congenital malformation, and is seen in what has been termed by Pozzi the "cochleate" uterus. The uterus is commonly small, has an undue anterior bend or even curl, and also has a long conical vaginal cervix, with a small external os. This is the kind of uterus so often associated with a dysmenorrhœa of the spasmodic type, and also with sterility. It cannot be regarded as a displacement, and cannot be treated by any method of altering its position. Pessaries are never indicated for the treatment of these conditions of the uterus. The symptoms associated with the cochleate uterus require treatment, which is discussed under the heading Dysmenorrhœa. There is, however, one condition of extreme antoflexion of the uterus which is acquired,

and which is a real pathological state of the organ. It occurs in connection with acute inflammation of the utero-sacral ligaments, such as occasionally follows a puerperal infection of the uterus. The inflammatory swelling in the ligaments gradually subsides, and leads to cicatricial shortening of them, with the result that the uterus is pulled up, at the level of the internal os, towards the second piece of the sacrum. The vaginal portion of the cervix being held down by its vaginal attachments, and the fundus being at the same

Fig. 67.—Pathological Anteflexion of the Uterus due to Utero-Sacral Cellulitis with Cicatrization.

time pressed down by the intra-abdominal pressure, it follows that an acute anterior bend must occur at about the level of the internal os. Nevertheless, this acute bend does not cause symptoms. Whatever symptoms there are must be the result of the inflammatory process and not of the bending of the uterus (Fig. 67).

The uterus is occasionally pushed down in a position of extreme anteversion by tumours above it—*e.g.*, ovarian tumours. This displacement of the uterus, however, does not cause symptoms (Fig. 68).

LATERAL DISPLACEMENTS OF THE UTERUS.

Cause.

These alterations in the position of the uterus occur only as a result of the pressure of tumours or the dragging of contracting scar tissue. Thus, the uterus may be pushed over to one side or the other by a small ovarian tumour, or by an inflammatory mass

Fig. 68.—Uterus pushed down and anteverted by an Ovarian Cyst.

in the parametrium, the result of a pelvic cellulitis following delivery (Figs. 69, 70). In the opposite manner, when the same inflammatory exudate is being absorbed, contraction of the base of the broad ligament occurs, and the uterus is drawn over to the other side of the pelvis. In the same manner lateral displacements sometimes result from salpingo-oöphoritis or from small tumours other than ovarian.

Symptoms.

Such lateral displacements, however, cause no symptoms; it is the lesion which causes the displacement, and accounts for any symptoms which may be complained of.

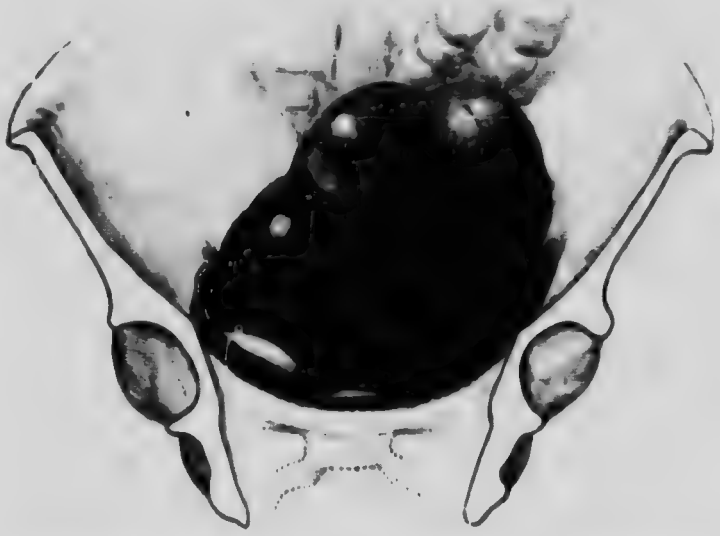
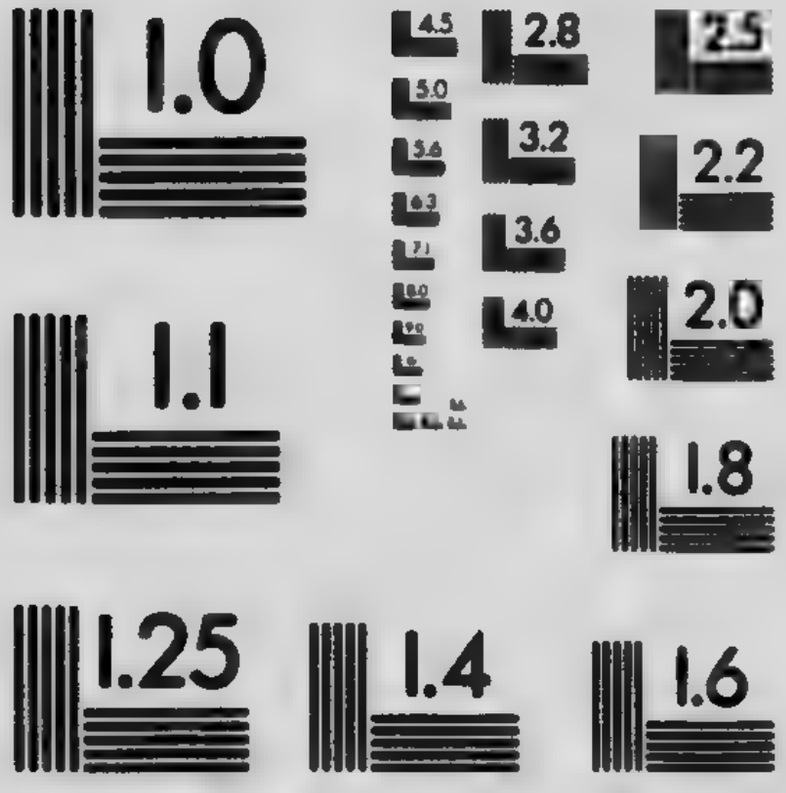


FIG. 69.—THE UTERUS PUSHED UP OUT OF THE PELVIS, AND DISPLACED LATERALLY, BY THE PRESSURE OF AN OVARIAN CYST.

FIG. 70.—THE UTERUS DISPLACED LATERALLY BY A BROAD LIGAMENT: CELLULITIS "PARAMETRITIS."

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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Treatment.

Lateral displacements in themselves require no treatment; the lesion which causes them has to be treated.

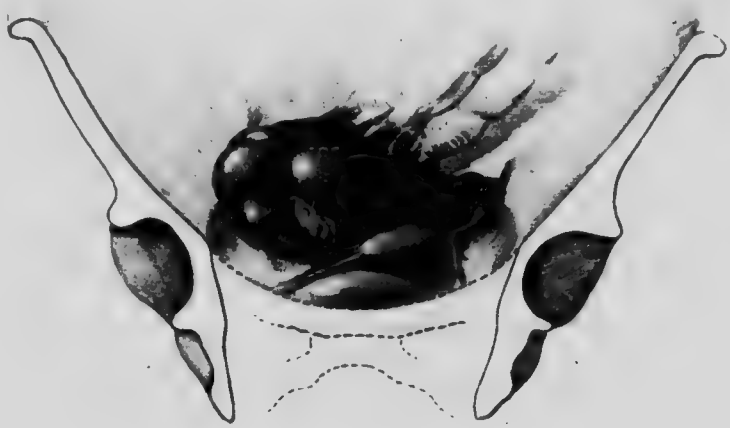


Fig. 71.—Uterus laterally displaced and raised by Adherent Suppurating Appendages—following Labour.

Fig. 72.—The Uterus raised up out of the Pelvis by a Broad Ligament or Fimbrial Cyst.

ELEVATION OR UPWARD DISPLACEMENT OF THE UTERUS.

Cause.

This occurs sometimes, either as the result of pressure or traction by a tumour deeply seated in the pelvis, or as a result of the formation of adhesions above the pelvis when the uterus was enlarged after delivery. The latter condition could only be accounted for by an inflammatory process around the proximal end of the Fallopian tube, and would naturally be the result of a puerperal infection. If elevation of the uterus is due to a tumour, it will generally be found that it is either a broad-ligament cyst or an ovarian cyst adherent at the bottom of Douglas's pouch, or a collection of blood (pelvic hæmatocele) or pus. With some broad-ligament cysts, the gradual opening up of the ligament puts the Fallopian tube on the stretch, and, as it were, levers up the uterus out of the pelvis as the tumour enlarges (Figs. 71, 72).

Symptoms.

The displacement in itself gives rise to no symptoms.

Signs.

In such a case the uterus is found to be displaced to one side as a rule, and part of it at least is above the level of the symphysis pubis. In other cases a tumour, generally ovarian, is found adherent in Douglas's pouch, and has the broad ligament spread out over it like a hood. The tension of the broad ligament again drags the uterus up out of the pelvis, or the tumour itself actually pushes it up.

These upward displacements of the uterus are not of any real importance in themselves; but they form valuable points in the differential diagnosis of pelvic tumours, and the elevated position enables the contour of the uterus to be made out bimanually, and serves to separate it from the tumour.

RETROPOSITION OF THE UTERUS.

By this term is meant that the uterus lies unusually far back in the hollow of the sacrum. The organ remains anteverted normally, and shows no unusual version or flexion. It has no know usation, gives rise to no particular symptoms, and requires no tr nent. The term is merely retained as a convenient one to describe an uncommon position of the uterus.

CHAPTER XX

INVERSION OF THE UTERUS

The uterus is turned inside out and appears in the vagina, protruding through the os uteri. It is not, strictly speaking, a displacement of the uterus in the ordinary acceptation of the term. It occurs under two conditions—namely, acute puerperal inversion, the accident taking place at the end of delivery, during the third stage; or chronic inversion, having no relation to parturition, but due to the expulsion of a tumour from the uterine cavity, carrying the uterine wall with it (see Fig. 75). If acute puerperal inversion is unrecognized or untreated at the time of its occurrence, it persists and becomes chronic. Acute puerperal inversion belongs strictly to the province of obstetrics, but chronic inversion of either variety is regarded as gynæcological.

Anatomically, inversion of the uterus may be complete or incomplete, meaning that the whole uterus is inverted into the vagina in the first case, whilst only a portion is inverted in the second case, and may present at the os uteri or have partly passed through it. In the complete variety the inverted uterus appears in the vagina as a pyriform mass, with its narrow end upwards. The os uteri forms the uppermost portion, and can usually be felt encircling the narrow neck of the uterus. In the incomplete variety more or less of the inverted fundus uteri may appear in the vagina or may present at the cervix (see Figs. 73, 74). Unless the inversion is combined with a considerable amount of prolapse, a very rare occurrence, the inverted fundus will not project outside the vulva.

Cause.

Acute puerperal inversion may be spontaneous, or may be caused by the efforts used to deliver the placenta (see "Midwifery," p. 450). In spontaneous cases it is believed that the placenta must be situated at the fundus; that the portion of the uterus to which the placenta is attached is relaxed; and, finally, that the rest of the uterus, gripping the placenta during

a contraction, expels it into the vagina, carrying with it the relaxed placental site. This implies also that the placenta must have an unduly strong attachment to the uterus. If the inversion is caused by extraneous efforts to deliver the placenta, it may be accomplished in three possible ways: Either by attempting to express an adherent placenta when the uterus is relaxed; by grasping an adherent placenta from inside the uterus, and pulling it out

Fig. 73.—Acute Puerperal Inversion of the Uterus: First Stage.

(without first separating it), thus dragging the fundus down with the placenta; or by pulling on the cord with an adherent placenta and a relaxed uterus. Puerperal inversion is much more commonly complete than incomplete, and so great is the force by which the accident is produced that the fundus uteri may even lie outside the vulva. As a rule the placenta is partly, and may be completely, detached during the process; but in rare cases there is no detachment at all, the placenta being morbidly adherent all over. When

inversion is not puerperal, it is due to the expulsion of a tumour attached at the fundus, such as a fibro-myoma or a sarcoma. It is a slow process; the uterine contractions grasp the projecting tumour and gradually force it down, dilating the cervical canal and os uteri *en route*. Why it is that in an occasional case this accident happens, instead of the tumour becoming pedunculated as it is extruded, which is the rule, is not known.

Symptoms.

In acute puerperal inversion, profound shock and bleeding are the two cardinal symptoms. The bleeding may be severe, but

Fig. 74.—Acute Puerperal Inversion of the Uterus: Complete.

Fig. 75.—Incomplete Inversion of the Uterus by a Submucous Fibroid attached to the Fundus.

quite often the shock is great, out of all proportion to the amount of blood lost. The patient becomes pale, complains of faintness, or actually becomes unconscious, with a small rapid pulse. Later, restlessness and air hunger occur, as in post-partum hæmorrhage. In the cases which are not diagnosed, a copious hæmorrhage usually occurs, but ceases spontaneously, whilst the placenta comes away

either by expression or by the patient's efforts to expel it. In such cases a vaginal examination is not necessarily made, and so the accident remains unsuspected, until the continuation of bleeding and pelvic pain at a later date calls for complete investigation of the case. Sometimes the condition remains unsuspected for weeks, months, or even years, the symptoms in such cases being at first prolonged lochial discharge, then small but repeated hæmor-

FIG. 76. COMPLETE INVERSION OF THE UTERUS BY A SUBMUCOUS FIBROID ATTACHED TO THE FUNDUS.

rhages, or the persistence of a blood-stained discharge with menorrhagia. Pelvic pain and bearing down nearly always accompany the irregular bleeding. During the puerperium there is almost always some fever, and, owing to superficial sloughing of the exposed fundus, there is an offensive smell with the discharge. The occurrence of infection of the exposed fundus is a grave danger to the patient, and may lead to a fatal septicæmia, especially if efforts at reposition are made during the acute infection. The symptoms of inversion due to a tumour are practically the same as those which

occur when a fibro-myoma is being extruded and becoming pedunculated—namely, painful contractions and more or less continuous bleeding, with excessive menstrual losses. Sloughing of portions of the tumour may result from strangulation and subsequent infection, producing an offensive discharge. Rises of temperature resulting from toxæmia may occur as in the puerperal variety.

Diagnosis.

In acute puerperal inversion the condition is recognized by the profound shock, the severe hæmorrhage, and by the result of a bimanual examination. The placenta attached to the fundus uteri may be seen outside the vulva, or may be wholly within the vaginal orifice. On bimanual examination, the mass in the vagina will be pyriform, with its narrow portion upwards; the os uteri will be felt encircling the highest portion; and the hand on the abdomen will fail to feel the fundus in its usual situation, but will notice a cup-shaped depression at the vaginal roof instead. At the edges of this cup the ovaries and tubes may be felt when they are dragged upon by the inverted fundus (see Figs. 73, 74).

It is difficult to imagine any lesion which could be mistaken for an acute puerperal inversion. When the condition has existed some days or for a much longer time, diagnosis is not always quite so simple. In such cases the only lesion likely to be confounded with inversion is the extrusion of a fibro-myoma, which every now and then happens in the puerperium. In all cases of tumours being extruded from the uterus, unless they cause inversion themselves, a definite cavity can be recognized in the uterus by the finger or the sound, and the fundus uteri with its convex contour will be felt in the abdomen or pelvis on bimanual examination. In the case of a large fibro-myoma just presenting at the os uteri, the amount of uterine cavity to be felt will depend on the size of the tumour and the extent of its attachments, and in any case the uterus will have a convex fundus. The same applies to cases of pedunculated fibroid polypi appearing through the cervix in the vagina (Figs. 77, 78). In chronic inversion the mass in the vagina is dark red or purple in colour, fairly smooth on the surface except where ulceration may have occurred. The os uteri is felt around the narrow neck, and, if the inversion is complete, it is impossible to pass a finger or sound up between them. When incomplete, the sound will pass up a varying distance, but the concave or cup-like feel of the upper portion will reveal the true nature of the condition (see p. 355).

When inversion is caused by extrusion of a tumour, the diagnosis may be much more difficult. The inversion is not infrequently

incomplete, whilst the puerperal form is much more commonly complete. In this case there may be still some uterine cavity to be felt (see Fig. 76), and the amount of uterine wall which has been dragged in may be slight. In other cases the absence of the fundus uteri above will be as marked a feature as in the puerperal cases.

Treatment.

In the acute puerperal variety, the ideal treatment is immediate replacement after separating the placenta. It must be remembered,

Fig. 77. – Submucous Fibro-Myoma presenting at the External Os Uteri.

however, that the patient will be in a most dangerous condition of shock in most cases, and the manipulations necessary to replace the uterus may cause more bleeding and make the shock more profound, and thus prove fatal. Every case must be treated on its merits. In some severe cases it is far better to administer saline infusions and cardiac stimulants, and wait for some hours before administering an anæsthetic and replacing the uterus. Pituitary extract will be of value in combating against shock and in

stopping hæmorrhage. If the condition of the patient permits, immediate replacement under an anæsthetic may be carried out. The principle must be to grasp the bulbous fundus with the whole hand in the vagina, making steady upward pressure with the fingers against the uppermost portion near the os uteri, the idea being to return first the part which came down last. The other hand on the abdomen makes counter-pressure and steadies the whole utero-vaginal mass. Replacement is usually quite easy when performed

Fig. 78.—Pedunculated Fibroid Polypus presenting at the External Os Uteri, simulating Inversion.

at once, before the cervix has had time to shrink and constrict the neck of the protruding mass. If undertaken within a few days of the accident, replacement is generally not difficult. Again, however, delay may be wise, in this instance on account of sepsis, sloughing, or ulceration of the protruding mass. If these complications are present, vaginal douches of hypertonic salt solution or of hydrogen peroxide should be used, and no attempt at replacement tried until the temperature is normal. When replacement cannot be accomplished by the fingers, Aveling's repositor must be used, and is almost uniformly successful. Even if many months have elapsed

since the accident, the repositor will generally succeed in effecting replacement. The instrument consists of a vulcanite cup mounted on a S-shaped metal stem. The stem has four elastic bands attached to its lower end, which are tied to a band which fastens round the patient's waist. The cup and stem must be placed in the vagina in such a way that the cup presses against the lowest part of

Fig. 79.—Aveling's Repositor for Chronic Inversion of the Uterus.

the inverted fundus, and gauze plugging must be inserted to prevent it slipping. When the elastic bands are fastened to the belt, they exert a constant upward pressure upon the fundus through the vulcanite cup. This steady pressure usually succeeds in replacing the inversion within forty-eight hours, often much less. No harm can result from the use of the instrument if it is properly applied and does not slip. It must be remembered, however, that when

replacement is complete the cup will be inside the uterus, above the os uteri This may give rise to difficulty in extracting the cup from the uterus. It has been suggested to substitute a smaller cup for the first one used, when replacement is nearly complete, or a much more solid modification of the cup may be used which has no marked projecting brim. The patient must be examined from time to time, as if slipping is undetected the rim of the cup may

Fig. 80.—Aveling's Repositor in Position.

cause ulceration of the fundus. This instrumental replacement may be a painful process, in which case morphia must be given hypodermically whilst it is in progress (Figs. 79, 80).

In the rare cases in which Aveling's repositor fails, recourse must be had to operative methods to cure the condi[tion]. These have for their principle the division of the constriction at the os uteri, and, if necessary, part of the narrow neck of the inversion, either by the vaginal or the abdominal route. When sufficient opening has been made, the fundus is pushed upwards, the highest part first, and so gradually replaced. Afterwards any incisions which

have been made must be sutured. If there is much ulceration and sepsis, the better procedure would be to perform vaginal hysterectomy.

Where the inversion is caused by tumours, considerable discretion must be used in deciding upon the treatment to be adopted. In all malignant growths, usually sarcomata, complete hysterectomy must be performed, usually by the vaginal method. If, however, the tumour is a fibro-myoma and single, it may be possible to shell out the tumour and then replace the uterus. There is, however, considerable danger of tearing through the uterine wall, perhaps without recognizing the accident, during the shelling-out process. It is particularly likely to occur when the amount of inversion is small. Indeed, this accident has usually occurred when the inversion has not been recognized at all. The operation can only be carried out with safety when a definite capsule can be recognized, from which the tumour can be enucleated without interfering with the uterine muscle. If this cannot be done, the interests of the patient will be best served by performing vaginal hysterectomy. As a rule, vaginal hysterectomy is easy in all inversion cases in which the operation is necessary. If, however, the tumour is a large one, some morcellation operation might be necessary before the removal could be completed, owing to the difficulty of delivering the mass through the vulva and getting at the vaginal roof.

SECTION VI.—INFECTION OF THE GENERATIVE SYSTEM

CHAPTER XXI

INTRODUCTION

ALTHOUGH infective diseases of the genital canal, as a whole, are common, yet it may be said in general that it is not easy to infect the vagina or vaginal portion of the cervix under ordinary conditions. The vagina, being lined by epidermis without glands, is very resistant to the common skin organisms; whilst the vulva, with its liability to small injuries, is not. Moreover, it has long been believed that there is in the vaginal secretion a protective medium against infection. The mixed secretion of the uterus and vagina has an acid reaction, supposed by some to be due to lactic acid, produced by the growth of an acid-producing organism, the vagina bacillus. Most common bacteria are killed, or their growth is inhibited, by this acid vaginal secretion. In addition to this chemical protection, it must not be forgotten that there is a tendency for all vaginal fluids to escape, in all positions except the supine, and consequently there is a constant outward current from the vagina. For these main reasons the vagina is not so easily infected as some of the other cavities which are exposed to the air, such as the nose and throat. In married women, at least, there cannot be any lack of bacterial contamination of the vagina, and yet infective lesions do not usually occur, except under certain special conditions to be mentioned hereafter.

These arguments do not apply with anything like the same certainty to the cervical canal, the body of the uterus, or the urethra. In the two former situations, the secretions are always alkaline or neutral; consequently they do not oppose the same bar to the growth of organisms, although the presence of mucus has a retarding effect on bacterial growth. In addition there are folds, crypts, and glands in all these situations where bacteria can be lodged and multiply.

secure from disturbance by the outflow of the secretions of the part. Thus it is that infection of the cervix, body of the uterus, and urethra, is much more readily brought about.

On the other hand, the liability to infection may be increased in all situations by alteration of the amount and the reaction of the secretions, as well as by traumatism. It therefore follows that, when the acid vaginal secretion is altered so that it is a profuse alkaline discharge, part of the protective mechanism is gone. This occurs constantly during menstruation, sometimes during pregnancy, and always during labour and the lying-in period. Traumatism is common at the vulva at all times, the effects of scratching, abrasion, and minor injuries, generally being seen in the vulvitis of children and adults. More important injuries to the cervix, vagina, and vulva during labour are fertile fields for infective processes.

Pregnancy, labour, and the lying-in period, therefore, constitute some of the great factors in predisposing to infections of the generative tract. The other great factor is gonorrhœa. The reason for this is that the disease is almost always contracted during coitus. The actual infection is brought about either at the moment of entrance of the male organ or at the moment of emission. In the one case the urethral orifice may be infected from a drop of pus on the male meatus urinarius; in the other case the cervix is infected by the admixture of pus and semen. Gonorrhœa therefore primarily affects those two places where organisms will flourish best. Apart from these two great groups of infective diseases, there are a few minor conditions which have nothing to do with childbirth or gonorrhœa. The wearing of pessaries, the constant use of vaginal douches (for cleanliness' sake!), and some blood-borne infections, form small groups quite subsidiary to the two great classes above-mentioned.

When once some part of the genital canal is infected—*e.g.*, the cervix—no matter what the organism may be, there is a special tendency that the infection will spread upwards viâ the uterus to the tubes, ovaries, and peritoneum, or downwards to the vagina. This tendency to spread by direct continuity of mucous membrane is most marked in gonorrhœa, but may occur in puerperal infections. On the other hand, there is a much greater likelihood that puerperal infections will spread viâ the lymphatics or the blood-stream, and thus give rise to secondary lesions at a distance.

Gonorrhœa therefore may cause inflammation of every part of the genital canal in turn. Starting with a cervicitis, endometritis, salpingitis, oöphoritis, and peritonitis may follow. Infection of the placental site after labour always sets up a septic endometritis.

from which secondary results may follow, but not necessarily so. Thus, from a septic endometritis infection may travel viâ the lymphatics, setting up local or general peritonitis along with ovarian and tubal infection, perhaps leading to an ovarian abscess or a pyosalpinx. In other cases the infection may travel by direct continuity through the uterine wall (metritis) to the broad ligament, setting up cellulitis. The lymphatics no doubt play some part in this. In a much smaller percentage of cases the infection causes thrombosis of the uterine and pelvic veins, and thus allows direct infection of the blood-stream. In all these varieties of secondary infection there is generalized septicæmia more or less severe.

CHAPTER XXII

VULVITIS AND VAGINITIS

VULVITIS.

Vulvitis, or inflammation of the vulva, may be acute or chronic. The common cause of acute vulvitis is gonorrhœa; it may be seen both in children and adults, and is characterized by the presence of an acute urethritis, inflammation of the glands of Bartholin, and a purulent discharge.

Membranous vulvitis may occur as a manifestation of true diphtheria caused by the Klebs-Löffler bacillus, or may be due to streptococci. Aphthous vulvitis (thrush) may accompany the disease elsewhere. It is characterized by the presence of a white membrane in patches without ulceration. It is caused by the *Oidium albicans*. Gangrenous vulvitis (noma pudendi) occasionally occurs in children after the acute specific fevers. It causes profound toxæmia, and is a dangerous complication to occur in a child who is already exhausted by an acute illness. Pain may be slight, as the child may be torpid from toxæmia. The pulse-rate is an important guide to the gravity of the infection.

All these except the gonorrhœal variety are very rare. Mucous tubercles occur during secondary syphilis. They form symmetrical lesions, are usually multiple, and early become complicated by sepsis. They tend to extend backwards towards the anus. Soft sores form small punched-out ulcers opposite each other on the inner surface of the labia. They usually have yellow sloughy bases.

Chronic or subacute vulvitis may be a sequel of the acute gonorrhœal variety. It also results from chronic irritation by highly acid or saccharine urine, by the discharges from a vesico-vaginal or recto-vaginal fistula, and by any irritating discharge issuing from the vagina—for instance, that from a cancerous cervix.

In patients in whom attention is not paid to keeping the vulva clean, vulvitis may result, and is accentuated by scratching. This is especially the case when pediculi pubis are present. Pediculi pubis

cause irritation only when they are accidental visitors, they do not worry their regular host. (See also Kraurosis vulvæ, Leucoplakia, and Pruritus vulvæ.) Adhesion of the labia has been described as a sequel of acute vulvitis. It may be mentioned that adhesion of the nymphæ is commonly found in infants. They are only adherent because of the presence of mucus, and are easily separated without operative treatment.

Treatment.

One of the greatest risks in these cases is the extension of the disease upwards, and therefore no douching, passing of sounds, or vaginal examination, should be permitted. Warm baths and fomentations, and the application of lead lotion or a weak antiseptic, will relieve the itching and burning. If much pus is present, the hair should be removed. If the vulvitis is due to the presence of discharges that cannot be stopped, a thick ointment, such as unguentum zinci, is useful. Gonorrhœal warts, if small, may be destroyed with pure phenol, but if large they require excision under an anæsthetic. Gangrenous vulvitis will require full treatment on general surgical lines. After incision, a culture should be taken in all cases. The child should be sat in a bath of warm non-poisonous weak antiseptic at short intervals. Stimulants are indicated.

Mucous tubercles require constitutional treatment, and locally should be sponged with a solution of 1 in 2,000 perchloride of mercury. Soft sores may be treated with a similar lotion and dusted with iodoform powder. All forms of chronic vulvitis are associated with intense irritation, and, as the scratching causes abrasions and increases the inflammation, any of the methods of allaying the irritation mentioned in the treatment of pruritus (*q.v.*) may be employed. An ointment containing calomel is frequently used. In the diabetic cases dieting and general treatment are essential.

VAGINITIS.

In discussing gonorrhœa, it is stated that the vagina more frequently is the channel through which discharges from above flow than the site where the discharge originates. Probably the most important reason for this is that the vagina is lined by squamous epithelium, and that glands are practically absent; with such a lining, and with good drainage by being open below, the vagina is not predisposed to inflammation. Some protection against infection may also be given by its normal secretion being acid in reaction.

Cause.

Vaginitis may result from the gonococcus perforating its epithelium; this is especially likely to occur in children and in connection with pregnancy. Another important cause is the presence of foreign bodies in the vagina, such as a pessary or a fibroid polypus. It may also follow injuries, such as those resulting from labour or operation, if perfect asepsis is not maintained. It is also present in cases in which the discharge from an infected growth or fistula is constantly passing through the vagina. Thrush is a rare cause. Vaginitis occurs occasionally during acute specific fevers, such as enteric, scarlet fever, or diphtheria.

Senile vaginitis is a form occurring after the menopause. In it there is atrophy of the epithelium, so that the subjacent vascular papillæ are uncovered; thus red spots of varying size appear on the mucous membrane from the vulva upwards. Especially in the neighbourhood of the cervix the areas devoid of epithelium tend to adhere, so that bands grow up which obliterate the fornices and may even prevent the cervix being felt at all. Contraction of the connective tissue also causes a diminution of the lumen of the vagina. Owing to the partial absence of epithelium, slight bleeding occurs, and infection is usual, owing to the low vitality of the tissues; thus the symptom is a purulent discharge which is blood-stained.

Symptoms.

These are purulent discharge, burning pain, dyspareunia and dysuria. The vagina looks red, and discharge is present. It may be purulent or watery; in some cases it is frothy. In old-standing cases the vagina becomes rough; to this condition the name of "granular vaginitis" is given. The granular feeling is most marked in the posterior fornix, where a pool of pus from the cervix collects when the patient is in the recumbent position. It is frequently gonorrhœal in origin. In the uncommon variety due to thrush, the vagina is covered with white spots, and there is very little discharge.

Diagnosis.

This is made by finding the vagina hot, red, tender, perhaps even œdematous and covered with discharge. The latter is usually purulent, but the pus is mixed with mucus secreted by the cervical glands. In rare cases, when sloughs are present, the discharge may consist of grey watery offensive fluid containing small portions of sloughing tissue. If gas-forming organisms are the infective agents, there will be bubbles of gas in the discharge. A film should be

prepared for bacteriological examination. The Bacillus coli, streptococci and the gonococcus, are the most important organisms; but the very large number of saprophytic organisms usually present may make the identification of the causal organism difficult.

Before diagnosing primary vaginitis, the presence of disease higher up in the genital tract, such as cervical inflammation, must be excluded. The use of strongly astringent douches may precipitate the albumin in an ordinary discharge so that it may at first sight be mistaken for thrush.

Treatment of Vaginitis.

Any underlying condition should be treated if possible, and if the patient is wearing a pessary it should be removed. Douches are useful not only because of their antiseptic action, but also to prevent the discharge being retained. Vaginal suppositories containing antiseptics or astringents may be ordered. In chronic cases a speculum should be passed, and the vagina should be painted with tincture of iodine. Excellent results may be obtained by swabbing the vagina with brilliant green and crystal violet or packing with lint smeared with sulphur ointment. In the senile variety the use of strong antiseptics is not advisable.

Treatment on the lines indicated above should result in the cure of cases of primary vaginitis. In the senile type the prognosis is not good.

In very severe cases with sloughing (such as occasionally may be seen after a difficult labour or the application of strong caustics), there is a considerable risk of partial obliteration of the vagina from the granulating surfaces adhering together. An attempt should be made to prevent this by introducing plugging covered with a sterile lubricant to keep the granulating surface apart; otherwise the so-called "adhesive vaginitis" results.

In cases resisting the usual methods of treatment, an autogenous vaccine may be tried.

CHAPTER XXIII

ENDOMETRITIS

INFLAMMATION of the lining of the uterus is invariably the result of infection with bacteria which, in most cases, gain entrance by the vagina. Endometritis, however, may be a descending infection from the Fallopian tubes, as in the case of the tubercle bacillus; and in certain acute cases occurring during such zymotic diseases as enteric fever, influenza, pneumonia, etc., the infection may be carried viâ the blood-stream.

The endometrium is peculiarly liable to infection and inflammation under three conditions—namely, during or after parturition, as an upward spread of a gonorrhœal infection, or after the passage of a septic sound, or operation upon the interior of the uterus. There are no reliable statistics to show which of these is the commoner method of infection, but certainly hospital and private practice seem to show that puerperal infection is the most frequent. This does not imply that there is any very serious illness during the lying-in period in the majority of cases, but that the symptoms of endometritis follow directly upon parturition, and are the result of minor degrees of infection. In such cases a careful scrutiny usually shows that the puerperium was not normal, although the patient was not seriously ill, and perhaps was able to get up in the ordinary time. In these subacute cases it may even be impossible to prove that there has ever been an infection at all, but this will be referred to later.

ACUTE ENDOMETRITIS.

It is now well established that an acute inflammation of the endometrium is the common starting-place of the majority of severe puerperal infections, leading to septicæmia of a severe, moderate, or mild type. Further, it is practically certain that there is always some actual inflammation of the endometrium in those cases of sapræmia in which some decomposing material is found in the uterus. In the latter case the truly protective nature of inflam-

mation is manifest, because the condition subsides, usually leaving no traces, when the decomposing material is removed, or expelled naturally. The placental site, with its open bloodvessels and spongy decidua devoid of epithelial covering, is an ideal culture medium upon which bacteria will flourish, and through which the organisms can gain access to the living tissues and blood-stream. Further, during parturition there are always minute lacerations in the cervix which may serve for the entrance of organisms.

Cause.

Puerperal infection, gonorrhœa spreading upwards from the cervix, infection following operations upon the uterus, infection as a complication of zymotic diseases, and downward spreading in the case of tubercle, are all factors in the production of acute endometritis.

Puerperal Infection.—This is particularly likely to occur when there has been much intra-uterine manipulation. Placenta prævia is especially dangerous in this respect, because the placental site has its situation so close to the cervix, and consequently is nearer to all sources of infection. Manual removal of the placenta, especially when adherent and when removed by ungloved hands; difficult forceps applications, especially in occipito-posterior positions; versions; contracted pelvis requiring intra-uterine manipulations; in fact, any obstetric complication in which the hand has to be introduced into the uterus, or any prolonged manipulation carried out is a possible cause.

Gonorrhœa.—The initial implantation of the gonococcus is almost invariably the result of sexual connection, and the act of seminal emission carries with it pus laden with gonococci from the urethra straight against or into the cervix. In the cervix the gonococcus finds a secure resting-place amongst the folds of the mucous membrane and in the glands which open into the canal. From this initial breeding-ground, the gonococcus may travel downwards to the vagina, and upwards into the body of the uterus, and even farther by direct continuity of mucous surfaces to the Fallopian tubes.

Operations upon the Uterus.—Curettage of the uterus, the commonest operation upon this organ, is often carried out with the most perfunctory details of aseptic technique, by persons who never undertake any but the most minor of the operations of surgery. As a result minor degrees of infection of the uterus are set up, not necessarily making the patient very ill or jeopardizing her life, but

setting up a subacute endometritis, which is followed by long-continued disability and suffering. Some of the worst cases of acute endometritis have followed such a simple but highly dangerous procedure as passing a dirty uterine sound. It cannot be too strongly insisted upon, that the uterine sound should never be used except under aseptic precautions, when the sound has been boiled, the vagina swabbed, the cervix fully exposed, and the operator wears gloves.

The various methods of inducing abortion, criminal or otherwise, are fertile sources of endometrial infection, and, finally, such operations as removal of polypi, enucleation of submucous fibroids, incision of the cervix, or any other operative procedure upon the uterus, may be followed by infection.

Zymotic Diseases.—It is difficult to prove that acute endometritis may follow influenza, enteric fever, pneumonia, diphtheria, etc.; but it is a fact that in some cases the patient dates her uterine symptoms from these diseases. Also, in the case of post-mortem examinations in such cases, the respective organisms or those of secondary infections which accompany these diseases have been recovered from the uterine mucosa. The disease in these cases is usually subacute, and gives no very definite symptoms at the time, but its effects persist in a subacute or chronic form.

Tubercle.—Tuberculous endometritis is almost always a descending infection from the Fallopian tubes, involving the endometrium and sometimes the uterine muscle. In the cervix, however, it is not infrequently a primary disease. It must not, however, be inferred that uterine tuberculosis is at all common; the facts are quite otherwise. The uterus is one of the rare sites for a tuberculous infection.

The Infecting Organisms.—In parturition and abortion the infecting organism is almost always the streptococcus. Sometimes it is the typical long-chained Streptococcus pyogenes, but more frequently it is a streptococcus of the fæcalis type. This organism is not infrequently the only one found, a pure culture often being obtained from a swab taken from the interior of the uterus. It may, however, be combined with other organisms, such as the bacillus coli communis, the bacillus pyocyaneus, the bacillus aerogenes capsulatus, and others. The pneumococcus has been found in pure culture, and, usually, in the zymotic diseases the particular organism of the disease in question is the one found in the uterus. In gonorrhœa, it is but seldom that the gonococcus can be demonstrated unless the disease is of recent origin. It is practically impossible

to recover the gonococcus from the uterus if any length of time has elapsed since its implantation, and this may be the case even when it is known that a man has been recently infected by the woman. Unless the gonococcus can be demonstrated, there is no evidence that a given lesion is gonorrhœal. A tuberculous lesion can be demonstrated by finding giant-cell systems in the tissues, and sometimes the tubercle bacillus may be found after a prolonged search. Staining of a single section may fail to demonstrate it.

Symptoms.

Naturally, the symptoms will vary according as the cervix alone or the body of the uterus, or both, are infected. Acute gonorrhœal cervicitis is the initial lesion of gonorrhœa in most cases, and shows itself by a profuse purulent vaginal discharge. It is very irritating in character, and causes redness and excoriation of the skin of the vulva, thighs, and perineum. Accompanying this there is almost always a vulvitis, and perhaps a urethritis, so that the patient complains of scalding pain on micturition. When gonorrhœa spreads to the body of the uterus, as a rule there are no additional symptoms, just as there are none of gonorrhœal salpingitis until the peritoneum becomes infected. There is, however, one symptom which is of importance, and that is increase of the amount of the menstrual loss. Menorrhagia, and sometimes quite irregular bleeding, always follows upon a gonorrhœal endometritis, and consequently when the menstrual periods remain normal it is safe to reckon that the infection has not spread beyond the cervix. Thus it will be seen that the symptoms of acute gonorrhœa are really those of the cervical lesion, and those due to the invasion of the endometrium are often slight or not noticed. The vaginal discharge may become more watery, because the secretions from the body of the uterus are naturally more watery than those of the cervix alone. There may be some tenderness of the uterus on bimanual examination, but as a rule there is no appreciable enlargement, as the muscle coats are not affected.

Signs.

The chief changes found in the uterus, naturally, will be found in the endometrium, but to some extent the muscle coats will always be affected. An artificial distinction must be made between acute inflammation of the cervix and that of the uterine body. No doubt, in many cases, the two share equally in the infection. As a rule, the cervix shows marked inflammatory changes in a gonococcal infection long before the body of the

uterus is affected at all. Indeed, in some gonorrhœal cases the body of the uterus is never affected, but the infection is limited to the cervix. In an acute gonorrhœal cervicitis, the mucous membrane of the cervix can be seen through a speculum, swollen, deep red or purple-coloured, and pouting at the os uteri. The whole vaginal portion of the cervix is congested and swollen. Microscopically the cervical mucous membrane is densely infiltrated with leucocytes and plasma cells, especially around the gland orifices. When the endometrium is involved, there is the same leucocytic infiltration, and usually a necrotic layer on the surface where the epithelium has been detached by the inflammatory process. The leucocytes penetrate to some extent into the muscle, but this is never affected to any great extent in gonorrhœa, as it may be in a puerperal infection.

In all other acute infections, chief among which is the streptococcal, whether it be the result of parturition, abortion, or operations, the changes in the cervix or endometrium are much the same. There may be a badly infected laceration of the cervix, showing a torn surface covered by dirty yellow or greyish necrotic débris or slough. This is deeply infiltrated, and always has some necrosis on the surface. The muscle coats are infiltrated by leucocytes, which usually follow the course of the bloodvessels and lymphatics. In a sense the anatomical results are protective, because they represent a local reaction to the invading microbes. If the leucocytic infiltration is sufficient, the bacteria are gradually killed off, and the lesion remains localized to the endometrium or cervix. If, however, the virulence of the germs is very great, the local resistance may be quite inadequate to prevent their multiplication in the living tissues, and their entrance into the lymphatics or blood-stream. Thus it happens that, with an acute endometritis as a starting-point, infection may spread in three ways: either (1) by the lymphatics of the broad ligament, setting up pelvic peritonitis; or (2) by the bloodvessels causing a septic thrombophlebitis; or (3) by direct continuity through the uterine wall to the parametrium, setting up a pelvic cellulitis. These three avenues of infection are particularly followed in infections after labour, abortion, or operations, and by them all the lesions, which follow a puerperal septic infection can be explained. In a pure gonococcal infection none of these three avenues of infection is followed in the vast majority of cases. Gonorrhœa spreads along the mucous membrane of the uterus to the Fallopian tubes only by the direct continuity of the epithelial surfaces, and from the tubes direct infection of the peritoneum takes place through the abdominal

ostium. No doubt in some infections other than gonococcal this method of spreading does occur, particularly when the infection is subacute or chronic; but, as a rule, in acute streptococcal infections lymphatic spread is the rule rather than that by direct continuity of mucous membranes.

In the early stage the discharge from the cervix or urethra will show the gonococcus on appropriate staining. There is usually no rise of temperature of any importance.

In streptococcal infection from any cause, whether due to parturition, abortion, or operations, the uterus becomes enlarged, heavy, and tender, a purulent discharge comes away, and there are general symptoms and signs of great severity. The temperature rises rapidly, and there may be a rigor accompanying it. The pulse-rate rises in frequency, the patient looks and feels very ill, with headache, abdominal pain, and sometimes diarrhœa. If the infection remains localized to the uterus, the temperature and pulse-rate gradually subside, the discharge decreases, and the local tenderness becomes less, usually after a prolonged illness. The actual lesion of the endometrium may completely resolve, but quite frequently it becomes chronic, as will hereafter be described. If the infection is not localized, but spreads along any of the above-mentioned three avenues, the signs will be modified according as a pelvic peritonitis, a thrombophlebitis, or a pelvic cellulitis, results. In the very worst cases, when the infection is the result of the most virulent streptococci, the initial lesion is slight; but the organisms pass at once into the blood, set up a generalized septicæmia, and may prove fatal in three or four days. In all these lesions, even in uncomplicated endometritis, a septicæmia of more or less severity is set up; but in this case recovery is the rule. The presence of local lesions shows that the patient has some resisting power, which in the end is able to overcome the bacterial invasion. In puerperal or abortion cases, the endometritis delays the involution of the uterus, and prolonged lochial discharge results. In operation cases the next menstrual period is prolonged and excessive, and the succeeding ones will probably also be profuse.

Prognosis.

The commonest course of an acute endometritis is a gradual improvement of the acute symptoms, leaving a chronic endometritis with its three cardinal symptoms—menorrhagia, backache, and leucorrhœa. In a minor number of cases complete resolution occurs without leaving any symptoms, and in a very small number death from septicæmia takes place. Whatever the infecting organisms,

then, the immediate prognosis of uncomplicated acute endometritis is good, but the great probability of the lesion becoming chronic must be remembered. In gonorrhœal cases the gradual spread of infection to the tubes is a practical certainty, often in as short a time as six weeks from the date of infection. It is, therefore, clear that the risk to life is not great in gonorrhœa, but the risk of ill health is very great, whereas in puerperal cases or streptococcal cases in general the risk to life is much greater, but there is not the same likelihood of the tubes being infected by direct continuity. It is important to realize that the bulk of the serious and fatal cases in gynæcological practice are the result of septic infection of the endometrium.

Treatment.

The majority of cases of cervicitis are not seen until they are becoming chronic; but if they should be seen in the acute stage, it is not wise to attempt any active disinfection of the cervical canal. The passage of any instrument, like a probe coated with disinfectant, up the cervical canal, would be very likely to push infected discharge up into the body of the uterus, and thus bring about the very result which it is desired to avoid. The patient should be kept in bed if possible, and should be given hot vaginal douches of hypertonic salt solution with citrate of soda (sodium chloride 5 per cent., sodium citrate 1 per cent.). Some of this remaining in the vagina may have a good effect upon the cervical inflammation by causing an outward flow of lymph from the cervical canal. The same effect might be expected by placing a tablet of salt and citrate against the os uteri after using the douche. When the body of the uterus has actually become involved in gonorrhœal cases, active treatment is rarely indicated—in fact, is rarely possible, because the cases are not seen in this stage. It is quite certain that curettage is contra-indicated in acute gonorrhœal endometritis, because the resisting power of the patient will always lead to the formation of a phagocytic barrier in the endometrium, which effectually prevents any spread of infection by the lymph channels. Further, it is impossible even by curettage to remove all the infecting organisms, and consequently the lesion cannot be cured thus, nor can an upward spread to the Fallopian tubes be prevented with any certainty. Vaccine treatment in acute gonorrhœal endometritis may be expected to be beneficial, but at present experience of such treatment is limited. A stock gonococcus vaccine would have to be used, owing to the great difficulty of making an autogenous one. The dose should be a small one to begin with—2,000,000 as a rule. The effect of this must be noted, and the interval and amount of the next dose regulated

accordingly. As a general rule, there is no marked reaction from the vaccine, but occasionally a sharp rise of temperature follows. When there is such a reaction, the second dose should not be increased. It is usual to give the second dose at the end of a week. If there has been no reaction to the first dose, the second dose should be double the first, and so on. In acute streptococcal endometritis the essential method of treatment must be on bacteriological lines. There is no form of local treatment for the interior of the uterus

Fig. 31. Sterile Swab and Test-Tube for taking a Specimen of Discharge from the Vagina or Uterus.

which can be relied upon to do any material good, except, perhaps, in selected cases, drainage of the uterine cavity. In some patients, especially those with marked anterior flexion at the level of the internal os, drainage is insufficient, and in them the use of a rubber drainage-tube passed up to the fundus uteri provides a free exit for discharge and does no harm. Curettage is positively dangerous, as it removes the protective phagocyte barrier from the endometrium and lays bare fresh areas for the absorption of toxins, and allows easy ingress of bacteria. Washing out the uterus with antiseptic solutions

is useless, and repeated intra-uterine douches cannot be too strongly condemned. Experience will show, in the future, whether the hypertonic salt and citrate solution, injected into the uterus through a rubber drainage-tube, will help by producing a free outward flow of lymph from the uterus. The quantity required would be small, and its use in this manner is very different from that of repeated uterine douches carried out in the ordinary way.

Apart from local treatment, the first desideratum is to find out the nature of the infecting organism, and from it to prepare a vaccine. This is done at the beginning of the first serious symptoms by exposing the cervix, wiping it clean with sterile absorbent wool, and then passing a sterile swab on a long wire up into the uterine cavity. In this way infected discharge can be obtained from which cultures can be made. A better way is to suck up discharge from the interior of the uterus with a long sterile pipette, but the necessary apparatus for this is not always at hand. If the culture proves to be a pure streptococcus, a vaccine can be made at once; if impure, the culture must be plated out so as to separate the streptococcus from extraneous organisms. The first dose of vaccine should be 1,000,000 streptococci. It should be in general repeated in about twenty-four to thirty-six hours, according to the temperature. If the temperature remains high, the dose should be repeated, and may be increased provided no special reaction appears to follow the inoculation. If the temperature falls, a longer interval may be allowed to lapse before giving another dose (Fig. 81).

It cannot be said that the use of vaccines in these cases has reached finality. There is no doubt that they do good in a large proportion of the cases, both in reducing the mortality and in preventing after-effects. But more experience is required before definite rules can be laid down as to the size of the initial dose and the indication for further doses. It is also quite certain that the use of autogenous vaccines has given far better results than those obtained from stock vaccines.

General treatment in all cases of acute endometritis consists in sitting the patient up to provide vaginal drainage, attention to the bowels, and careful feeding. Saline infusions of 15 to 20 ounces at a time *per rectum* are most useful in promoting diuresis and assisting in the elimination of toxins.

CHAPTER XXIV

CHRONIC CERVICAL CATARRH, OR ENDOCERVICITIS

CHRONIC cervical catarrh, or endocervicitis, is an inflammatory affection, usually of long standing, involving the mucous membrane of the cervical canal and of the os uteri. Its outward sign is the "cervical erosion" or "catarrhal patch" in most cases, although catarrh of the canal may exist without any erosion. It is always the result of infection, and is accompanied by definite microscopic signs of inflammation (Plate I.).

CAUSE.

Endocervicitis is often a chronic affection following upon an acute infective process, such as has already been described under acute cervical inflammation. Thus, it may be gonorrhœal, and may follow a puerperal injury and infection, abortion, or operations on the cervix. Sometimes, however, none of these factors have been present. For instance, the condition is by no means uncommon in virgins, or quite young girls who are not known to have had any previous source of infection. Nevertheless, the lesion is still the result of infection, but the organisms may be of various kinds. Laceration of the cervix during labour, with subsequent exposure of the cervical mucous membrane, known as ectropion, is a fertile source of cervical catarrh.

Infecting Organism.—Gonorrhœa is one of the commonest causes of chronic cervical catarrh, but in this stage it is very rarely possible to find the gonococcus in the cervical discharge. It is only in acute cases, or cases which have been in existence a short time, that the gonococcus can be found. Secondary infection by other organisms is common in gonorrhœa, and these serve to keep the inflammatory process alive. There may be streptococci, staphylococci, bacillus coli communis, diphtheroid bacilli, etc. It can only be inferred from the history and the general appearance of the vulva, vagina, etc.,

that the original infection was gonorrhœal. Sometimes even this is quite impossible.

In other cases following labour or abortion, a variety of organisms may be found: the streptococcus pyogenes or fæcalis is common, often combined with diphtheroid bacilli and the bacillus coli communis. Sometimes only staphylococci are found. In virgins the diphtheroid bacilli are not infrequently found almost alone, but all the above germs may occur. It must be remembered that the vagina always contains organisms, especially in the lower half, so that it is not surprising that the cervix should become infected, if some illness or accidental circumstance leads to a lowered resistance to bacterial invasion.

It has long been taught that the undisturbed vagina contains a bacillus named the "vagina bacillus," which is said to produce an acid substance. This when mixed with the normal vaginal mixed secretion forms an acid medium in which pathogenic organisms will not grow. It is further believed that the acid substance is lactic acid. In some circumstances, especially during menstruation, this acid vaginal secretion is swept away by the alkaline blood and mucus, and thus the vagina contains a fluid in which bacteria will grow freely, and consequently infection is easy during or just after menstruation. The same sweeping away of the acid vaginal secretion occurs after labour, or in cases of vaginitis from the use of pessaries or from the constant use of douches. Thus, it is seen that even in virgins there are times when the protective vaginal secretion is lost and infection may become easy. Some doubt has been thrown on the general truth of these views, but the presence of an acid vaginal secretion in virgins is undoubted; it is only the explanation of it upon which all observers are not agreed.

Symptoms.

The chief symptom of cervical catarrh and cervical erosion is *leucorrhœa*, and backache is sometimes associated with it. They do not affect menstruation. The word "leucorrhœa" merely means a white discharge, and is used in a *loose* manner for any vaginal discharge which is not blood-stained. In this case the discharge is distinctive, and is described as like "unboiled white of egg." It may, however, be opaque or yellowish from the admixture of leucocytes and epithelial scales from the vagina. Seen through a speculum, there is always a thick tenacious plug of mucus in the cervical canal, and the patient will often volunteer the statement that the discharge comes away in lumps. The discharge is often increased just after a menstrual period, and may diminish to almost

nothing as the next period approaches. The backache is felt just at the upper end of the sacrum, and is the same in almost all chronic congestive or inflammatory diseases of the uterus.

Menstruation is only affected if there is chronic corporeal endometritis as well as cervical catarrh *(q.v.)*.

Signs.

The cervical erosion is one of the commonest gynæcological affections, and shows itself as a strawberry-red, somewhat raised granular-looking patch around the os uteri, replacing and contrasting clearly with the normal pink, smooth mucous membrane of the portio vaginalis.

Pathology.

A cervical erosion is not an ulcer, because there is no loss of substance, and the surface is not composed of granulation tissue. It is really a new growth composed of mucous glands and connective tissue, like those of the cervical canal; but it always shows somewhere, or at some period, foci of leucocytic infiltration between the glands, thus revealing its true inflammatory nature. If a section is made vertically through the normal os uteri, including the mucous membrane of the canal and the vaginal surface, it will be seen that the cervical mucous membrane, with its glands and columnar epithelial lining, changes rather abruptly at the external os to the squamous vaginal epithelium without any glands. In a cervical erosion, on the other hand, there is not this abrupt change, but the vaginal epithelium around the os, and to a varying extent over the vaginal portion of the cervix, is replaced by a thick layer of tissue closely resembling the cervical mucous membrane. In it, however, the gland structures are more complex and closely set than they are normally in the cervical canal, and the stroma is markedly altered by inflammatory changes. It must not be supposed that this is an exposure of the cervical mucosa such as occurs when the cervix is bilaterally split. There is no split in a true cervical erosion, and the curious appearance is really a new formation of glands and stroma replacing the vaginal epithelium. The surface of an erosion may be smooth and show only the openings of the glands upon it, or it may be thrown into projecting folds or finger-like processes. In the latter case it is known as a "papillary erosion," whilst if the glands show dilatations and cyst-like formations it is called a "follicular erosion." In either case the surface is covered by long columnar epithelium like that which lines the glands, the squamous epithelium of the rest of the vaginal portion gradually tailing off to blend with

this epithelium at the edge of the erosion. In some instances there is actual granulation tissue formed on an erosion between the openings of the glands. This is, of course, not covered by epithelium, but has a necrotic layer on the surface beneath which capillary loops approach near the surface, surrounded by young connective tissue infiltrated with leucocytes (Fig. 82).

The histological details of an erosion are clear enough and easy to demonstrate; the difficulties arise when an attempt is made to explain the method of formation of the lesion. It has already been said that there are no glands in the portio vaginalis, and also that

FIG. 82. - EROSION OF THE CERVIX.

Small diagram shows the character of the epithelium.

an erosion is not an exposure of cervical mucous membrane. It must therefore be a new formation. To explain this new formation two processes are necessary:

1. The squamous vaginal epithelium must be thrown off.

2. A layer of columnar epithelium must grow from somewhere to take its place.

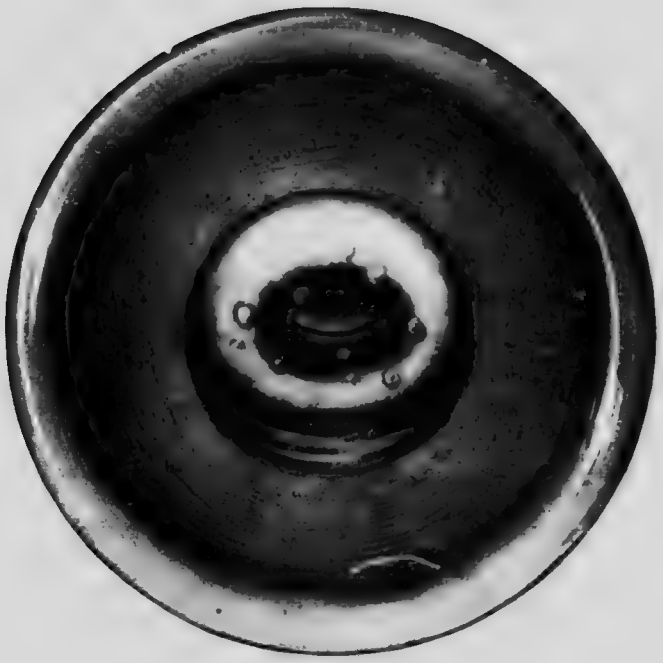
How are these changes brought about? The loss of the vaginal epithelium is, clearly, the result of an inflammatory process. Infection of the cervical canal spreads as an inflammatory process around the margins of the os uteri under the vaginal epithelium. This inflammation, being of a catarrhal nature, leads to shedding of the vaginal epithelium, just as the epidermis is shed in a weeping eczema. In ordinary circumstances the place of the epithelium would be taken by granulation tissue; but at the os uteri the conditions are

not ordinary, because close by them is the columnar lining of the cervical canal ready to proliferate actively under the stimulus of the chronic infective process, just as the endothelium of a joint, like the knee, proliferates in chronic infections. Now, a columnar epithelium, when proliferating, can only spread as an increased surface expansion: it cannot heap up into two or more layers. Consequently there is a gradually increasing area of surface covered by columnar epithelium, and this spreads down in a centrifugal manner on to the portio vaginalis around the external os. As the vaginal epithelium is thrown off, the columnar-clad surface gradually spreads and takes its place. This columnar-clad surface increases more rapidly than the denudation of the squamous epithelium proceeds, and consequently it must be thrown into folds and finger-like projections, or else it must dip into the tissues, forming shallow crypts. In this way glands are formed and the papillary processes are thrown out. The inflammatory process invariably stops at some distance from the os, and does not spread indefinitely on to the vaginal walls, so that eventually the erosion becomes circumscribed and no longer increases in size. It has been suggested that the squamous epithelium is only cast off down to the deepest layer, known as the stratum Malpighii, and that it is the proliferation of this layer which forms the columnar-clad surface of the erosion. There is something to be said in favour of each of these theories, but in the present state of our knowledge it seems probable that the first is the more likely explanation.

Ovula Nabothi.—Sometimes the mouths of the newly formed gland follicles become closed by adhesion of their lining, and consequently their secretion is retained. This leads to gradual distension of the glands, forming small projecting cysts on the surface. These are known as ovula Nabothi, and, although they are mentioned in anatomical works, they are really pathological formations. Sometimes, also, a very marked local overgrowth of the columnar epithelium-clad surface takes place in the lining of the cervical canal itself, in which case a projecting growth forms which may be either sessile or polypoid. Such a growth contains glands and cysts, and is known as a mucous polypus of the cervix (Fig. 83 and Plate II.).

Diagnosis.

A cervical erosion is sometimes mistaken for a malignant growth of the cervix, the squamous epithelioma or glandular carcinoma, and very rarely for a tuberculous ulcer. As a rule there should be no difficulty in distinguishing the first two lesions, but under some



conditions, especially if an erosion bleeds readily on touching it, there may be great difficulty in arriving at a diagnosis. In general an erosion is strawberry-red, slightly raised, and has a velvety feel with firm, hard, leathery tissue beneath. It does not bleed as a rule, except on fairly vigorous handling. When it does bleed easily, it is because parts of it are composed of actual granulation tissue without any epithelial covering, but with dilated capillary loops close to the surface. An early malignant growth, on the other hand, has a surface which is rough, bleeds easily on the slightest touch, and has a friable hardness quite unlike the elasticity of the tissues beneath an erosion. The hardness of a cancer is a dis-

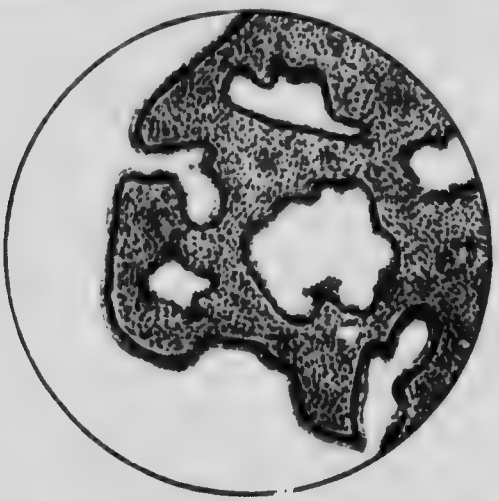


FIG. 83.—PORTION OF A MUCOUS POLYPUS OF THE CERVIX: GLAND-LIKE SPACES LINED BY COLUMNAR EPITHELIUM IN A FIBRO-CELLULAR VASCULAR STROMA.

tinct feature, but it is a brittle, friable hardness rather than a leathery toughness. When a real doubt exists as to the diagnosis between these two, the only safe method to employ is to cut out a wedge of tissue, including the erosion and the outlying normal cervical tissue, and to preserve it for section-cutting and microscopic examination. In the hands of a pathologist who is in the habit of examining uterine specimens, and with properly preserved tissue, there is never the slightest difficulty or doubt in the diagnosis of such a specimen. A rough guide is often furnished by using a sharp curette, for practically no impression is made on an erosion by an ordinary scrape with the curette, whilst irregular lumps of tissue are easily gouged out if a cancer is present. Curetted material, however, is not nearly so good for microscopic sections as a wedge deliberately cut out. Tuberculous ulceration of the cervix is almost always

mistaken for cancer, and can only be diagnosed with certainty by removing a wedge for microscopic examination: tuberculous giant-cell systems, and perhaps tubercle bacilli, will then be found in sections.

Prognosis.

Cervical catarrh may slowly undergo involution and the discharge cease. An erosion sometimes undergoes a spontaneous cure by the surface becoming overgrown and closed in by the vaginal squamous epithelium gradually replacing the columnar-clad surface. In such a case the gland orifices may remain open or may become closed. In the latter case the glands themselves distend with their secretions and become cystic. Sometimes this cystic transformation of the glands affects not only an erosion, but also the glands of the cervical canal. In this case numbers of cysts varying in size are produced, generally small and inconspicuous, but occasionally they are large and give rise to great increase in the size of the cervix. Such an enlargement might present difficulties in diagnosis, especially if no cysts were visible *per vaginam*.

A squamous epithelioma sometimes develops in an erosion, and sometimes in connection with a laceration of the cervix. These lesions, however, are so common, and they so often persist for years without any malignant invasion, that it cannot be said that there is any real evidence that they predispose to the development of cancer. Nevertheless, it is a fact that cancer of the cervix is very rare in virgins, common in married women, and commonest in women who have had children. It is also a fact that old inflammatory changes will be found in every cancerous cervix. In this sense it may be said that laceration and erosion predispose to the formation of a cancer, but the percentage of women with these lesions who develop cancer is very small.

Seeing that erosion and catarrh are always the result of infection, it would not be surprising if general symptoms and ill health the result of absorption of toxins occurred with both. This is certainly the case, and it is very gratifying to note the great improvement in general health which so often follows the cure of an erosion or a cervical catarrh. This is quite on a par with the ill health which accompanies such an infection as pyorrhœa alveolaris.

Treatment.

When an erosion or a cervical endometritis is unaccompanied by any other lesion of the uterus, treatment may be directed solely to it. In cases of pure erosion without much involvement of the

cervical canal, very simple palliative treatment may be sufficient to keep the patient comfortable and gradually lead to a natural cure. This consists in the use of astringent douches, once or twice a day as may be required. The most useful douche is made from powdered alum, 1 drachm to the pint of warm water. The best way to use the douche is first to wash out the vagina with a quart of warm sterile water to get rid of any discharge, and then to use a pint of the alum solution. It is best to use the douche lying flat on the back upon a bedpan, and to allow the solution to run slowly into and out of the vagina, pressing the labia together occasionally so as to allow the fluid to distend the vagina a little. As a general rule, an astringent solution like this does more good than the common antiseptic solutions, such as iodine, perchloride of mercury, formalin, etc. As an alternative to alum solution, chloride of zinc (5i. ad O.i.) or sulphate of zinc (5i. ad O.i.) may be used.

When, however, the erosion is of long standing, accompanied by a severe catarrh of the cervical canal and copious mucous discharge, some further local treatment is required, because vaginal douches cannot reach or affect the cervical canal. Large numbers of applications have from time to time been recommended for use inside the cervical canal, such as iodized phenol, tincture of iodine, nitrate of silver, chromic acid, carbolic acid, argyrol, protargol, etc. None of these, however, can be regarded as a certain cure in severe cases, and in the past much harm has been wrought from the patient's mental point of view by the continued use of these applications. Of recent years a saturated solution of picric acid in alcohol has been used with more success than was obtained with the above-mentioned drugs. In uncomplicated erosion the picric acid solution is particularly effective, and generally only requires about four applications at weekly intervals to produce so much improvement that the patient is satisfied. It does not answer quite so well in the cervical canal, but even there it is the best application to use. The method of use is as follows: The cervix is exposed by the largest Fergusson speculum which can be used without pain. Two long probes are thinly coated with absorbent wool and dipped in the picric solution. All mucus must be removed from the cervical canal with cotton-wool, if necessary dipped in liq. potassæ diluted four times. Then the canal as far as the internal os is swabbed with the picric acid solution, rubbing it in fairly energetically, avoiding bleeding if possible. Finally the erosion is thoroughly rubbed with the picric solution on small pledgets of wool held in forceps. The effect of the solution should be to coagulate all surface tissues and make them of a dead yellow colour. No vaseline or lubricant should be allowed

to touch the cervix, or the picric solution will not "take." This local treatment may be with great advantage combined with the use of an autogenous vaccine, prepared from the patient's particular organisms. In preparing a vaccine, some experience is needed to know which organisms to use if there are several varieties in the cultures; and, above all, in all cases in which gonorrhœa is suspected as the original cause, some stock gonococcus vaccine must be added to the autogenous preparation.

In occasional cases, where the erosion is very resistant to treatment, some operative procedure may be contemplated. If uncomplicated by much endocervicitis, all that may be required is to excise the erosion and suture the healthy vaginal surface to the lining of the canal. But if endocervicitis exists to any extent, this procedure will not cure the discharge. In other cases, especially if the cervix is hypertrophied from chronic areolar hyperplasia, it is better to perform amputation of the cervix, and to take the opportunity of trying to disinfect thoroughly the upper part of the canal.

Scraping is useless for the cure of a cervical catarrh. There is practically no material that can be removed even with a sharp curette, and the basal parts of the glands in which the infecting organisms rest are not removed. It has, of course, been done in numberless cases, but in almost all the result is disappointing, no improvement whatever occurring.

CHAPTER XXV

CHRONIC CORPOREAL ENDOMETRITIS

WHEREAS chronic endocervicitis and cervical erosion are clearly inflammatory lesions, showing the ordinary histological signs of inflammation together with the special features of an erosion, chronic corporeal endometritis does not show the signs of inflammation to the same degree or at all periods of its existence. On this account doubt has been thrown of late years on the title "chronic endometritis," and the question has been raised whether it should be retained. The term chronic endometritis has been in use many years, and modern writers who favour its retention have used it to designate a definite condition, in which thickening of the mucous membrane of the body of the uterus is accompanied by definite symptoms, of which the important ones are menorrhagia, leucorrhœa, and backache. Moreover, varieties of it have been described as glandular or interstitial, according as increase in size or complexity of the glands, or increase in the amount of connective tissue, contributes most towards the thickening of the endometrium. If it can be shown that thickening of the endometrium is the result of a chronic inflammation, and, further, if removal of the thickened endometrium and disinfection of the uterine cavity cures the symptoms, then it must be submitted that the case for the retention of the term chronic endometritis is made good. Nevertheless, the objection may still be raised that, even if the title is retained, it is no proof that the condition is, or even has been, a real inflammatory lesion of the uterine mucous membrane. A consideration of a large amount of material derived by curettage from the interior of the uterus in the cases which present the above-mentioned symptoms affords a considerable amount of evidence that chronic endometritis really is the result of an inflammatory lesion. To grasp the significance of this evidence, it is necessary to understand clearly what is meant by inflammation, and to realize how inflammation can affect a mucous membrane like that of the uterus. In an acute inflammation of the endometrium there is active diapedesis of

leucocytes from the capillaries into the stroma around the glands, desquamation of the surface epithelium and that of the superficial parts of the glands, and formation of a low type of granulation tissue with a necrotic layer towards the uterine cavity. The leucocytic infiltration shows all varieties of cells, comprising polynuclear leucocytes, lymphocytes, plasma cells, and endothelial leucocytes. During the process of repair which follows the successful reaction to the infection, these leucocytes gradually disappear,

FIG. 84. NORMAL THICKNESS (RELATIVE) OF THE ENDOMETRIUM.

FIG. 85.—THICKENED ENDOMETRIUM CHRONIC GLANDULAR ENDOMETRITIS WITH A SMALL MUCOUS POLYPUS.

and apparently, from numbers of sections examined, the plasma cell is the last to do so. If complete resolution occurs, the mucous membrane remains at the ordinary thickness, and, what is perhaps more important, there is no change in the rhythm of menstruation or the amount of blood lost. If, however, complete resolution does not occur because the infection remains for a time and becomes chronic, the mucous membrane thickens by overgrowth of its cellular stroma and by enlargement and increased tortuosity of its glands. This increase in the glandular elements comes about by active proliferation of the epithelial lining of the uterine cavity, which,

being columnar, can only form a single layer, and, if in active proliferation, must of necessity enlarge its surface area and not its thickness. Enlargement of its surface area leads to folding of the surface between existing glands, thereby deepening the glands and making them tortuous. It is quite possible, too, that actual new glands are produced by inward folding of the epithelial surface exactly in the same way that new glands are formed in a follicular erosion of the cervix. Moreover, when the mucous membrane is thickened in this manner, the patient has definite symptoms as a result—namely, menorrhagia, leucorrhœa, and backache. Finally, to clinch the argument, if at a later date this thickened mucous

FIG. 86.—CHRONIC GLANDULAR ENDOMETRITIS. ONE OF THE GLANDS HIGHLY MAGNIFIED.

membrane is removed by a sharp [illegible] after dilatation of the cervix, and the uterine cavity is disinfected by a strong antiseptic, these symptoms are often relieved.

This line of reasoning is accurately borne out by clinical experience, because large numbers of cases having the cardinal symptoms menorrhagia, leucorrhœa, and backache, follow upon confinements or abortions in which there has been evidence either of acute sepsis or of illness during the puerperium with perhaps only slight rises of temperature. It must be remembered that there are vast numbers of cases of slight septic infection of the uterus which give rise to after-symptoms but are not always recognized during the lying-in period. There is nothing more certain in obstetric and gynæcological practice, than the importance of labour or abortion as the chief ætiological factors in the majority of the minor diseases of women.

The real difficulty which has to be faced in chronic endometritis is found in those cases in which there is no clinical evidence that an active infection of the uterus has ever existed, particularly in those cases in which there has never been a pregnancy or any evidence of gonorrhœa. Such cases occur in virgins as well as in married women; the symptoms complained of are exactly the same—namely, menorrhagia, leucorrhœa, and backache; and, further, the curetted mucous membrane from them has exactly the same characters as that derived from cases which can be shown to have had an acute beginning. If the above-mentioned conception of chronic endometritis is correct, these cases must be very mild chronic infections from the first, devoid of acute symptoms, but leading to the same histological results and clinical symptoms. In the curetted material derived from these essentially chronic cases, there is the same increase in thickness of the mucous membrane, the same increase in depth and tortuosity of the glands, and the same relative increase in the stroma cells. In a certain small proportion of them inflammatory cells, in the shape of plasma cells, are found amongst the stroma cells. The proportion is small, but it is large enough to afford conclusive proof that the lesion is truly inflammatory in all.

Some recent researches have been widely quoted against this conception of the genesis of chronic endometritis. Numbers of uteri have been examined, as well as material obtained by curettage from individuals at different periods of the menstrual cycle. From this research it has been claimed that the endometrium normally thickens as the time for menstruation approaches, and also that there are changes in the glands and stroma which to some extent resemble the appearance described in chronic endometritis. The suggestion was made that the so-called chronic endometritis was only a condition of the endometrium caused by the changes which normally constitute the menstrual cycle. This theory appears to be too sweeping, and not entirely justified on either histological or clinical grounds. If it could be proved conclusively that all the material came from normal uteri, these arguments would have some weight; but it is obvious that when operations are performed on the uterus there must, as a rule, be some pelvic lesion present.

The arguments in favour of chronic endometritis being a real chronic inflammatory process may be summed up thus:

1. There is a condition of thickened endometrium associated with the symptoms menorrhagia, leucorrhœa, and backache.

2. The thickened endometrium shows enlarged tortuous glands in a relatively increased cellular stroma.

3. In a small proportion of the cases plasma cells are found in

the stroma, representing the last remnants of a past inflammatory lesion.

4. The thickening may therefore be taken to represent the overgrowth moiety of a past inflammatory process.

5. Removal of the thickened endometrium and disinfection of the uterus cures the symptoms menorrhagia, leucorrhœa, and backache.

The opponents of these views give the name "diffuse benign adenoma" to the thickened endometrium, thus implying that the lesion is really a new growth. There is, however, no justification for such an assumption, any more than there is in the case of the cervical erosion, which is obviously an inflammatory lesion.

Cause.

In a proportion of cases an acute onset is known to have occurred, either as a result of a streptococcal infection following labour or abortion, or of a gonorrhœal infection apart from pregnancy. Other organisms are found in acute endometritis, but these are the common ones. In those cases which show no acute onset clinically, organisms are very seldom found in the interior of the uterus; but the histological appearances of the endometrium are exactly the same as in those cases in which the onset was known to have been acute. It is therefore quite reasonable to believe that the chronic cases also were due to infection at the commencement. As a virgin can acquire an erosion of the cervix not due to gonorrhœa or to the effects of pregnancy, but due to some other organism, such as the common diphtheroid bacillus, so often found in the vagina, it is not difficult to believe that any such infection may spread up to the endometrium. This occurs in an insidious manner, without any acute illness, and shows its results only later in the symptoms of a chronic endometritis. Sometimes the symptoms date from an acute illness like influenza, pneumonia, typhoid fever, or from mere lowered resistance the result of a simple chill. It does not follow that the specific organism of these diseases produces the endometritis, but, rather, that the illness lowers the resisting powers and allows infection by any organisms which happen to be present in the vagina.

When chronic endometritis is associated with retroversion and flexion of the uterus, or with fibromyomata, it follows that some mild infection is the cause on purely general grounds. It is just possible that the thickened endometrium in these cases is caused by simple chronic congestion; but, seeing that the uterus is always

exposed to the vagina and the organisms in it, there is no difficulty in believing that all such lesions are really the result of infection.

Histological Appearances of the Endometrium.—It has already been shown that the endometrium is thickened. If the thickening is brought about by increase in size and tortuosity of the glands out of proportion to the stroma, it is called glandular endometritis. If the stroma is increased out of proportion to the glands, interstitial endometritis is spoken of (Figs. 84, 85, 86).

Glandular Endometritis.—This has been subdivided into hypertrophic and hyperplastic forms. In the first the glands are enlarged and more tortuous, but preserve a tubular character, as shown in Fig. 87. In the second the glands become much more irregular in

Fig. 87.—Chronic Glandular Endometritis. Hypertrophic Variety.

shape, on account of great tortuosity and projection into them of almost papillary-looking tufts of epithelial cells, as shown in Figs. 88, 89. In some hypertrophic cases the glands are so dilated in places as almost to merit the term "cystic" endometritis. In others there is a great dilatation of the capillary vessels as well as the glandular enlargement, giving an angeiomatous appearance. It was these peculiar appearances which led the older writers to speak of fungous, hæmorrhagic, polypoid, cystic, etc., endometritis. It is quite unnecessary to preserve these terms, as they only mean variations in the amount of congestion and hypertrophy of the endometrial tissues. Just as mucous polypus of the cervix is always a localized hypertrophy of an infected mucous membrane of the cervix, so a localized hypertrophy of the endometrium may give rise to one large or several small polypi of a similar nature (see Fig. 83). These

small growths may be termed, and are in reality, adenomata, but it is quite unnecessary to speak of a generally thickened endometrium as a "diffuse benign adenoma" of the uterus.

FIG. 88.—CHRONIC GLANDULAR ENDOMETRITIS. HYPERPLASTIC VARIETY.

FIG. 89.—CHRONIC GLANDULAR ENDOMETRITIS. HYPERPLASTIC VARIETY. ONE OF THE GLANDS HIGHLY MAGNIFIED.

In certain cases the stroma is increased out of proportion to the glands; this is known as interstitial endometritis. It is an uncommon condition, and rarely occurs before the menopause. It is essentially the lesion in senile endometritis, in which the glands disappear, the stroma is increased, and the surface is converted into a species of granulation tissue.

Symptoms.

Any patient who presents the symptom-complex of menorrhagia, leucorrhœa, and backache, has chronic endometritis, whatever other lesion there may be, whether it is a displacement, a new growth, or an inflammatory lesion of the tubes and ovaries.

Menstruation is prolonged and excessive in quantity, and very often the interval between the periods is shortened. The leucorrhœa merely signifies a discharge which in this instance is more watery than that which is produced by an uncomplicated cervical catarrh. The discharge is often blood-stained between the periods, a significant symptom which often raises the question of a malignant growth, especially in elderly women. The backache is a sacralgia much the same as in chronic inflammatory lesions of the cervix.

Signs.

In an uncomplicated case the uterus is a little enlarged in all its diameters, and in some cases may be tender on bimanual manipulation.

Diagnosis.

It is important to be certain whether the case is one of uncomplicated endometritis, or whether it is associated with a backward displacement, a fibromyoma of the uterus, or with a chronic salpingo-oophoritis.

The diagnosis of these additional lesions is sufficiently easy as a rule, and is dealt with under their separate headings. The greatest difficulty, however, may arise in those cases in which menorrhagia is present, and in addition a blood-stained discharge between the periods. Carcinoma of the body of the uterus, chronic metritis or "fibrosis" uteri, a polypus of the cervix or body of the uterus, chronic inversion, or a submucous fibroid, are the important lesions which give this symptom as well as chronic endometritis. To distinguish these it will often be necessary to dilate the cervix and explore the body of the uterus with the finger or sharp curette. Carcinoma cannot possibly be diagnosed in its early stages without an exploratory curettage and a microscopical examination of the material removed.

Treatment.

In the slight cases, judged by the symptoms, improvement can often be produced by drugs which control the uterine muscle, blood-vessels, or the blood itself. For instance, ergot is undoubtedly the

drug which will lead to efficient uterine contractions, and in so doing gradually reduce the circulation through the organ to normal proportions. Thus hæmorrhage is controlled and resolution of a chronic inflammatory process is encouraged. In giving ergot, however, it must be remembered that full doses must be given, and a preparation must be chosen which has been physiologically tested and is known to have an effect upon smooth muscle. Further, ergot should be given over a long period—perhaps three months continuously; it is practically useless to give it only at the periods. There is no harm to be anticipated from giving ergot in pharmacopœial preparations for many months. A useful preparation is as follows:

R	Extracti ergotæ liquidi	ʒi.
	Acidi nitrohydrochlorici diluti	♏x.
	Syrupi aurantii	ʒss.
	Aquam	ad ʒi.

Misce. Sig.: To be taken three times a day after food.

If there is any reason to suspect deficient calcium blood-content, and sometimes on purely empirical grounds, calcium lactate may be given, with remarkable results. It may be prescribed in powders or tablets, half a drachm being a minimum dose, and taken every alternate night with half a pint of water, for two months, afterwards reduced. It acts better, however, if it is given as freshly prepared hydrous calcium lactate. This can be made by dissolving precipitated chalk in pure lactic acid. Thus, 200 grains of lactic acid, 75 grains of precipitated chalk, and 8 minims of chloroform, in 8 ounces of water, produce a mixture containing nearly 30 grains of calcium lactate in each ounce (Blair Bell).

Occasionally cotarnine preparations, hydrastis, or viburnum pranifolium may be given alone or combined with ergot; but their action is uncertain, and if ergot and calcium lactate do not diminish the hæmorrhage no other drugs will, as a rule.

The radical treatment of chronic endometritis is curettage with a sharp curette, after dilatation of the cervix under an anæsthetic. The object of the operation is to remove the mucous membrane completely down to the muscle, leaving only the deepest portions of the glands, from which the endometrium is regenerated. The one essential of the operation, which is too often overlooked, is that it should be aseptic. If it is performed in a perfunctory manner, the interior of the uterus will be reinfected and the thickened endometrium will re-form. Indeed, some patients are actually worse

after curettage for this very reason. The essential points in the technique of the operation are -

1. The preparation of the vagina and vulva.
2. The dilatation and scraping.
3. The after-treatment.

The whole vulva and vagina should be swabbed out with tincture of iodine. This does no harm, and disinfects the vagina better than any other harmless method. Nothing which is in the least likely to be septic should then be put into the vagina: therefore the hands must be gloved and everything else boiled.

The degree of dilatation depends on whether a simple curettage or digital exploration is required.

The cavity should be swabbed out with a strong antiseptic, such as iodized phenol on sterile cotton wicks.

The uterus should not be plugged, unless there is such severe bleeding as to require it. No douches need be given afterwards.

Although the operation of curettage will cure the symptoms of a real case of uncomplicated endometritis, it must be clearly understood that curettage is not to be recommended indiscriminately in every case of uterine hæmorrhage. There is no doubt that the operation is often performed in cases in which it is not indicated, and consequently falls into disrepute.

CHAPTER XXVI

CHRONIC METRITIS OR "FIBROSIS UTERI"

Whether chronic metritis is the best term to apply to the clinical condition usually so named is not certain, and, indeed, it is probable that more than one pathological condition is at present grouped under this head. This name, however, is open to less objection than any of the others in common use, provided that it remembered that the termination "-itis" does not connote inflammation. It is merely the Greek feminine adjectival termination, "metritis" being an abbreviated form of ἡ μητρίτις νόσος (the womb disease). Another name which is sometimes used is "fibrosis uteri," and "chronic subinvolution," also, is to some extent synonymous with it. Its leading characteristic is severe and uncontrollable uterine haemorrhage, which generally shows itself in women over the age of forty, though it is fairly often seen before that age. It is more common in parous women.

Pathology and Cause.

All observers are agreed that the wall of the uterus is increased in thickness in these cases from the normal ½ inch up to a maximum of about 1¼ inches. In the vast majority it is also denser and harder than in the healthy state, though some cases have been described in which it was unduly soft and flabby, in which under the microscope its constituent tissues were seen to be swollen and hyaline. The thickening and hardening of the uterine wall tend to straighten out the uterus and to obliterate the usual flexion. The endometrium may be, but often is not, increased in thickness. When the uterus is cut with a knife, the cut surface is somewhat striated, the lumina of the divided vessels gape, and the vessel walls tend to be unusually prominent, though otherwise the tissues seem less vascular than normal.

The generally accepted view of the histological condition present has been that there is a great increase in the amount of the fibrous tissue both amongst the muscle bundles and in the walls of the smaller arteries, where it may be in a state of hyaline degeneration. There is sometimes also some inflammatory infiltration with leuco-

cytes. Recently, however, careful investigation has shown that there is really a general increase of all the tissue elements of the wall of the uterus, but that the relative increase of each of these elements varies in different cases. Two main groups have been distinguished: one which seems to be identical with chronic subinvolution, and a second which seems to be a pure hypertrophy of the uterus.

In uteri of the first group there is a general increase of all the elements of the uterine wall in varying proportions, but not of the fibrous tissue in particular. Thus, when the whole wall is 100 per cent. thicker than normal, the fibrous tissue may be increased by only 4 per cent. The greatest increase is in the muscular tissue, the next greatest in the elastic tissue, and the least in the fibrous tissue. Now, in a nulliparous uterus the elastic tissue is present only as the internal elastic lamina of the bloodvessels and as a few very small fibrils elsewhere. In the normal parous uterus, however, the elastic tissue lies also outside the vessels and groups of vessels and between the muscle bundles. In uteri of the type of chronic subinvolution there is the same kind of arrangement of the elastic tissue as in the normal parous uterus, but both the elastic tissue and the other tissues are present in greatly increased quantities; in other words, there is chronic subinvolution.

In uteri of the hypertrophic type all elements of the uterine wall are hypertrophied, including the endometrium in all cases, but the arrangement of tissue is that seen in the nulliparous uterus: that is to say, the elastic tissue is present almost entirely as the internal elastic lamina of the bloodvessels. In these cases it is possible that the whole condition is secondary to thickening of the endometrium, which may act as a foreign body, so to speak, and cause energetic contractions of the uterine wall, thus leading to hypertrophy.

Since infection of the uterus is the chief cause of subinvolution, it is easy to understand that the subinvoluted type is probably due to some infection occurring at the time of labour or abortion, though this infection may have been of so mild a degree as to cause practically no constitutional disturbance at the time. The resulting symptoms are of gradual onset, and do not arise generally until some years after the infection. The probability is that the increased amount of elastic tissue interferes with the control exercised by the muscle of the uterus over the bloodvessels, and is thus indirectly the cause of the uterine hæmorrhage. As age advances the muscle of the uterus begins to atrophy, and only when this atrophy has reached a stage which renders the muscular control

of the vessels inefficient does the hæmorrhage become a marked symptom, at a time which will vary with the particular amount of elastic tissue in the uterus in question. For instance, this may not occur until the actual menopause begins, in cases in which the increase in the amount of elastic tissue is small.

Other kinds of infection besides those of puerperal origin are not uncommon in the uterus *e.g.*, gonococcal infection, or streptococcal or staphylococcal infection; and it seems that "fibrosis" may follow these. It is perhaps due in some cases to syphilis. The pathology of such cases may not be identical with that of either of the groups described above, and may form a third group.

Symptoms and Signs.

As already mentioned, the chief symptom is hæmorrhage, generally a profuse menorrhagia, with sometimes irregular hæmorrhages also. There may be leucorrhœa, backache, and a feeling of weight and dragging. In the hypertrophic type dysmenorrhœa may be added to these.

On examination, the uterus is found to be enlarged symmetrically to about the size of a six-weeks-pregnant uterus, and the consistence of both body and cervix tends to be firmer than the normal.

Diagnosis.

The presence of this disease can only be proved after the uterus has been removed and examined. It may, however, be inferred when curettage has failed to cure the hæmorrhage, provided that no neoplasm was found in the uterus at the time of curettage, and especially if at that time the endometrium was not found to be thickened, although, as already mentioned, thickening of the endometrium often accompanies "fibrosis" of the uterine wall.

Treatment.

Uterine styptics are generally useless, but in the milder cases which show themselves at or near the menopause the use of calcium lactate and of the salts of cotarnine is sometimes effective. As a rule, cases are cured only by hysterectomy after curettage has been tried, often repeatedly, and has failed. It is important that hysterectomy should be done before the patient has become gravely anæmic.

Radium also has been used, with varying success, in the treatment of these cases, but should never be tried until other conditions, such as a small submucous fibroid or carcinoma, have been excluded by exploration of the cavity of the uterus.

CHAPTER XXVII

SUBINVOLUTION

Involution of the uterus may be defined as the process by which the uterus gradually returns to its normal size, weight, consistence, and anatomical position, after delivery at full time or before that period. The retardation or partial failure of this process to become complete within the usual time is known as subinvolution. As a rule involution is complete in six to ten weeks.

Primarily, involution of the uterus is associated with the muscular contraction and retraction of the organ; but these alone will not produce a progressive shrinkage of the uterus whereby its weight gradually diminishes from about 2 pounds just after delivery to 2 ounces at the end of six weeks. The corresponding diminution in measurement is from about 8 inches in length after delivery to $3\frac{1}{2}$ inches when involution is complete. It is now believed that the actual process of shrinkage is brought about by autolysis or peptonization of the protoplasm of the muscle cells, with subsequent absorption of the products thus produced. In this way the muscle cells progressively diminish in size, and so bring about the shrinkage of the organ as a whole. This process must clearly depend to a great extent upon the amount of blood flowing through the uterus, and the circulation in its turn is controlled by the contraction and retraction. Thus diminished blood-flow through the uterus must be taken to be the initial factor which determines normal involution.

Cause.

Any cause which will interfere with uterine contraction and retraction is the chief ætiological factor in the production of subinvolution. In general it may be said that such factors are purely local, and the commonest of them is the retention of products of conception in the uterus, such as portions of placenta, membranes (always chorion), or blood-clots. These retained products of conception may remain quite aseptic or may become infected and

undergo decomposition, but in either case involution is delayed. Involution of the uterus is delayed by infection alone without decomposing contents leading to a septic endometritis, and with or without general septicæmia or the other local pelvic lesions which may follow it. Acute retroflexion of the uterus, sufficient to cause retention of lochial discharge in the uterus, or congestion from interference with the normal venous return, will delay involution. Severe laceration of the cervix, if accompanied by sepsis, acute inversion of the uterus, and the necrosis or detrusion of uterine fibromyomata are rarer causes. Certain conditions operate before delivery, such as distension of the uterus by hydramnios and twins.

Constipation and overdistension of the bladder may cause subinvolution by interfering with the circulation through the uterus, but it is quite unlikely that they will operate alone. Some mild septic condition is almost certain to be present in such cases. Getting up too soon has long been regarded as a cause, but it has been abundantly proved that it is not the mere assumption of the erect posture which causes subinvolution, but the condition of altered circulation in the pelvic organs consequent upon resumption of hard work is the real factor.

In addition to these local causes, certain general conditions have been from time to time looked upon as factors in the causation of subinvolution. Acute zymotic diseases, such as typhoid fever, pneumonia, scarlet fever, and others, may affect the involution of the uterus, but they by no means invariably do so. When they do, it is highly probable that the uterus in some way becomes infected with the specific organism, possibly through the blood-stream.

Chronic diseases like tuberculosis and heart disease have been cited as causes, but there are numbers of such cases in which involution proceeds normally. It is more than probable that some pathological condition exists locally, when subinvolution occurs in the course of a chronic debilitating disease.

Lactation has always been looked upon as promoting involution of the uterus, but it does not follow that the absence of milk in the breasts, or a refusal to suckle an infant, are causes of subinvolution. There is no real evidence that the deliberate avoidance of suckling is a cause of subinvolution. When no milk is secreted, and subinvolution occurs as well, it is probable that there is some change in the circulating blood which leads to both conditions. A deficiency of calcium salts has been suggested as a cause.

Symptoms.

The first symptom of subinvolution is the persistence of red lochia, along with a uterus whose size is too great for the particular day of the puerperium in question. In these circumstances subinvolution may be called acute, and belongs to the province of obstetrics. Later on, however, perhaps six weeks or two months after delivery, there may still be a discharge which is more or less blood-stained, the uterus remaining too large, and in addition the patient complains of backache and a feeling as if "the inside were dropping out." Along with this the patient feels weak, is incapable of walking much, complains of headache, and in general is not recovering from the effects of a confinement. Still later the effects of subinvolution show themselves by menorrhagia, leucorrhœa, and backache, with an enlarged uterus and a thickened endometrium. It is probable that, after many years, the condition known as chronic metritis or fibrosis uteri, with its main symptom, irregular hæmorrhage, is really a manifestation of a past condition of subinvolution, especially as a result of uterine sepsis.

Signs and Diagnosis.

The chief difficulty in diagnosis is first to establish the fact that the uterus is too large, and secondly to make out whether there are any retained products of conception. In the early days of the puerperium it is easy enough to measure the height of the fundus uteri above the pubes, and to deduce from this whether involution is proceeding normally. The fundus uteri, usually about 5 inches above the pubes twenty-four hours after delivery, should descend at the rate of about half an inch a day. When, however, the fundus uteri is below the level of the symphysis pubis, the size of the organ must be estimated by a bimanual examination.

The retention of conception products is not always easy to establish, especially after early abortions. When the whole of the material which has been expelled from the uterus can be seen and examined, it is usually not difficult to say whether the products are complete. After abortions, however, the products of conception are not always expelled entire, and consequently some may have been lost. In many such cases no decision can be made until after exploration of the uterine cavity with the finger.

Treatment.

The differential diagnosis of the above-mentioned conditions naturally determines the treatment to be adopted. In every case in which there is the least suspicion that conception products are retained, exploration of the interior of the uterus is imperative. An exception to this may be made in the case of the retention of pieces of chorion. It is quite common for this to happen and to give rise to transitory delay in the involution of the uterus. In such cases the piece of chorion nearly always comes away by itself in the first week or breaks up and comes away piecemeal in a degenerate condition. In the first two weeks after delivery the proper instrument for exploring the uterus is the gloved finger. The cervix will nearly always admit the finger without the use of mechanical dilators up to about the tenth day, if any products are retained. After that time and after abortions, as a rule, metal dilators must be used first. Any macroscopic retained products, when discovered, can be removed by the finger alone, the ovum forceps, or the blunt flushing curette. When either of the latter instruments is used, the cervix must be held with a tenaculum and the instrument used with care, because in all cases of subinvolution the uterine wall can be perforated with comparative ease. After removal of retained products, the uterine cavity should be flushed out with hot salt solution or some mild antiseptic, such as 1 in 160 saponified cresol or iodine. If decomposition has occurred, an attempt to disinfect the uterine cavity may be carried out; but this is not of much use if there is bleeding going on. If, however, the cavity can be mopped out fairly dry, there is no harm in swabbing it all over with tincture of iodine. After such an operation it is not necessary to plug the uterus as a general rule; if, however, the uterus is flabby, contracts badly, and is bleeding, a sterilized plug of antiseptic gauze, such as bismuth gauze, iodoform, or double cyanide of mercury, may be used as a temporary measure. When the uterus begins to contract these plugs are apt to cause pain; they may then be removed, even if they have only been in place a few hours. No douching is necessary afterwards; in fact it may be harmful, as a possible source of infection by washing septic bacteria up into the uterus. It is well to keep the uterus contracted afterwards by giving full doses of the liquid extract of ergot.

The retention of lochial discharge in acute retroflexion of the uterus is not always easy to treat. The uterus must be first replaced by the fingers, with the patient in the knee and elbow position, and then kept in place by sitting her up, so as to keep

the pressure of the abdominal contents on the back of the uterus. Later, when involution is proceeding, a ring pessary may be inserted to prevent a possible recurrence of the displacement. All septic conditions of the uterus and surrounding organs must receive their appropriate treatment (see Septic puerperal infection). When subinvolution is the result of some general metabolic condition, two drugs stand out as eminently useful and curative. Full doses of ergot must be given, usually a drachm of the liquid extract or 8 grains of ergotin, three times a day. The ergot should be continued for a month as a rule. Calcium lactate is the other valuable drug, and it may be given at the same time as the ergot. It is best administered in 30-grain doses every other night for a fortnight.

When there is very chronic backward displacement of the uterus accompanying subinvolution, replacement and treatment by pessary or operation are indicated.

CHAPTER XXVIII

SENILE ENDOMETRITIS

SENILE endometritis is a condition of inflammation of the lining of the uterus occurring in old women, or at least in women past the menopause.

CAUSE.

This is always obscure, but the condition of the endometrium makes it abundantly clear that the exciting cause is always bacterial infection. The actual method of infection can rarely be ascertained, but it is highly probable that in most cases it comes about by an upward spread of infection from the cervix. The cervix always shows inflammatory changes in these cases. The organisms which have been found are usually the streptococcus pyogenes, the gonococcus, and the bacillus coli communis. The possibility of the infection being carried to the uterus by the blood-stream cannot be overlooked, and the presence of old pelvic inflammatory lesions may have led to intestinal adhesions which would predispose to uterine infection. In some cases the infection has been carried directly into the uterus by the passage of a sound, which has not been sterilized, or has become contaminated with some infected material from the vagina during its passage.

PATHOLOGY.

The appearance of the endometrium is essentially different from that seen in chronic corporeal endometritis. It is not thickened by overgrowth of glands and stroma, but is rather thin and atrophied. The immediate effect of infection is to set up an inflammation of the catarrhal type, leading to desquamation of the surface epithelium, and next to leucocytic infiltration of the stroma. Later there is an increase in the stroma cells, and some new fibrillated connective tissue appears, whilst the surface is converted more or less into granulation tissue. Remnants of glands are seen in this latter tissue and amidst the new connective tissue. As a rule these pro-

cesses take a long time to crystallize. There is usually no acute stage which can be recognized; the lesion is essentially a chronic process. The effect of the formation of granulation tissue in the uterus is seen in the discharge, which is purulent and often very offensive, quite different from the discharges of endometritis in younger women. This discharge, too, is often blood-stained, giving rise to the suspicion that the lesion is really a carcinoma of the body of the uterus. Another important effect is seen in the accumulation of pus in the uterus, the cavity slowly dilating to accommodate larger and larger quantities of pus. This comes about, not because the cervical canal is closed, but because the muscular walls of the uterus are atrophied; and failing the usual propelling force the uterus is unable to expel its contents. In most of these cases it is quite easy to pass a sound into the uterus, showing that the canal of the cervix is patent. This condition of pus accumulation in the uterus is known as "pyometra." Pyometra is more often met with in cases of carcinoma of the cervix, associated with senile endometritis, or even with corporeal cancer, but it occurs in a proportion of the cases in which there is no malignant disease at all.

It does not follow that every case of senile endometritis will be accompanied by pyometra. On the contrary, this complication is quite an uncommon one, because, as a general rule, there is sufficient tone in the uterine muscle to prevent the accumulation of discharge in the uterine cavity.

Symptoms.

The outstanding symptom is the presence of a purulent, often blood-stained, and sometimes offensive, discharge. Occasionally quite free hæmorrhage occurs, as might be expected from the vascular character of the altered endometrium. Pain of an indefinite nature is practically always present, and some degree of toxæmia is seen in a proportion of the cases. Where a pyometra is present, profound toxæmia may occur with all the symptoms of a pyogenic infection.

Diagnosis.

This is always a difficulty, because of the impossibility of excluding cancerous growths of the body of the uterus by any simple method of examination. In practice, the differential diagnosis of the cause of a purulent blood-stained uterine discharge in women past the menopause always lies between cancer and senile endometritis. Even if the patient has a bleeding senile vaginitis, there may be a carcinoma of the uterus or a senile endometritis in addition. In the absence of any obvious growth of the cervix, the diagnosis will

remain in doubt until the cervix has been dilated and the interior of the uterus has been explored with the finger or sharp curette. The material obtained in this way will be very small in amount in senile endometritis, and will consist of atrophied endometrium and granulation tissue. In carcinoma of the body of the uterus or of the cervical canal, the material obtained will be large in amount, will be cut out in cheesy masses, and have the microscopic appearances of one or other variety of carcinoma.

An interesting point in the diagnosis is the great difficulty of estimating the size of the uterus when a pyometra is present. The organ forms a flabby bag sometimes containing a pint of pus, and is so soft and unresisting that it may not be recognized at all on bimanual examination.

There is no reason why senile endometritis should not occur in connection with obsolete uterine fibromyomata, in which case the uterus will be enlarged, often irregular in shape, and sometimes extremely hard, if any of the tumours are calcified.

Treatment.

In uncomplicated senile endometritis, curettage and disinfection of the uterine cavity is indicated. As a rule there is no risk of setting up a generalized septicæmia, such as there is in acute puerperal endometritis. A sharp curette should be used, the cavity should be dried out with absorbent wool mops, and then thoroughly rubbed over with pure carbolic acid or iodized phenol. The cavity should be drained for twenty-four hours with a wick of gauze.

When, however, there is a pyometra uncomplicated by the presence of a malignant growth, the best treatment is to regard the uterus as an abscess cavity, and to wash it out and drain it. The cervix must be well dilated, and the pus must be washed out by using a double-action metal uterine catheter. When the fluid used (sterile saline, or weak iodine solution) returns quite clear, a firm rubber drainage-tube with lateral holes should be introduced up to the fundus, and fixed to the cervix by an absorbable catgut suture. A week's drainage and daily washing out through the tube is usually sufficient to effect a cure, but in some cases the symptoms recur. The effect on the toxæmia, when present, is very marked when thorough uterine drainage is present. In some intractable recurrent cases of senile endometritis the uterus may have to be removed.

CHAPTER XXIX

SALPINGITIS

In the disease usually termed "salpingitis," the tube is, as a rule, not the only organ affected, as the inflammation involves the ovary secondarily in nearly every case, and adhesions exist between the tubo-ovarian mass and the surrounding organs. Hence in most cases the full name would be more correctly "peri-salpingo-oöphoritis," but for the sake of brevity this is usually curtailed to "salpingitis."

Varieties.

The disease may be acute or chronic: the latter is almost always the result of the former.

Acute salpingitis may be non-suppurative or suppurative. In the early stages of an attack catarrhal inflammation is present, and if the infection is sufficiently virulent, as it frequently is, this goes on to suppuration. The condition resulting from suppurative salpingitis depends on whether the fimbriated extremity of the tube becomes occluded by adhesive inflammation or not. If it is occluded, the tube becomes distended with pus, and a pyosalpinx results. This is the usual course of the disease. More rarely the fimbriated end of the tube remains open, and the pus is free to escape into the pelvis, setting up an intraperitoneal pelvic abscess without any actual distension of the tube with pus taking place.

Chronic salpingitis may be associated with distension of the tube so that a pyosalpinx or hydrosalpinx results, or the tube wall may become thickened by chronic inflammation without any distension of its lumen with fluid.

Pathology.

In the non-suppurative stage the tube wall is congested and œdematous. On section the plicæ of the tube are swollen, small-celled infiltration is present, and interstitial hæmorrhages may be seen. Some of the epithelium covering the plicæ which line the tubal mucosa is lost. If two plicæ, thus denuded of epithelium,

come into contact, they frequently adhere, thus shutting off a small area at their base in which secretion collects to form a pseudo-cyst. The secretion is at first clear, but gradually tends to become purulent. In the case of a pyosalpinx the middle layers of the tube become thickened and infiltrated with leucocytes. The mucosa is flattened down as a result of the distension, and the long papillary processes destroyed to a greater or lesser extent. In places the wall of the tube may be lined by granulation tissue and no mucosa seen.

In the case of a hydrosalpinx, the tube wall is often much thinner, so that it may be quite translucent. The plicæ of the mucous membrane will be flattened down according to the amount of tension in the tube. In a long-standing case very little epithelium may be recognized.

FIG. 90.—DOUBLE PYOSALPINX SEEN FROM ABOVE

U., Uterus; *L.T.*, left tube with adhesions to uterus and rectum; *R.T.*, right tube with adhesions to uterus and rectum.

As the tube becomes distended it opens up the mesosalpinx, and separates one layer from another; and when it distends it also becomes longer, and, as the mesosalpinx below does not alter in length, it follows that the tube becomes curved along the top of the mesosalpinx (broad ligament). As this curving continues, the tube becomes in time twisted and kinked at acute angles on itself; but the more important change is that it becomes bent round to the back, so that the fimbriated end comes to lie in the pouch of Douglas. If both tubes are affected, they come in contact behind,

and may even intercommunicate. If only one tube is affected, it may extend across the middle line to the opposite side; but more frequently it becomes fixed to the back of the broad ligament of its own side, and so is anchored in position there. The fimbriated extremity of the tube becomes occluded partly by the swelling which takes place in its mucosa, but mainly by plastic lymph forming over the fimbriæ, and sticking them to each other and also to an adjacent organ, such as the ovary. If the ovary happens to be cystic, the dilated tube becomes adherent to the cyst, and the cavity of the tube may get into communication with that of the ovary, and thus a tubo-ovarian cyst or abscess may result (Fig. 90).

As has been stated above, in cases of pyosalpinx the tube wall is usually thicker than normal; this, together with extensive peritoneal adhesions, may be regarded as protective to the patient, as it tends to prevent rupture of the tube into the general peritoneal cavity—an accident which would have serious consequences, but which is, fortunately, very rare. Similarly, the sealing off of the ends of the tubes, although it prevents the subsequent passage of ova through the tube, and therefore renders the patient sterile, protects the peritoneum from the pus which would otherwise drip out from the fimbriated extremity. The uterine end of the tube has such a fine lumen that the swelling of the inflamed mucosa is sufficient to occlude it, and thus a pyosalpinx never drains into the uterus. Because the ampulla becomes more distended than the other parts of the tube, the shape of a pyosalpinx is usually that of a retort.

Cause.

It was formerly believed that salpingitis could be caused by cold, strains, or over-exercise during menstruation, etc.; but with the increase of bacteriological research it became evident that inflammation of the tube must fall into line with inflammations of other viscera, and can only be explained as a result of bacterial infection.

The exact organisms which are at work may be difficult to demonstrate, because it has not been customary to operate on salpingitis by abdominal section during the acute stage; and in chronic cases the organisms tend to die out, so that, on examination, the pus may be found to be sterile, or a secondary infection from the bowel may be present. The three common causes of tubal inflammation are puerperal infection, gonorrhœa, and appendicitis. It is also seen as a complication of infected uterine fibroids and carcinoma. Tuberculosis (*q.v.*) is also met with not infrequently.

As regards the methods of infection, it is usual to divide them into three forms:

(*a*) **Ascending Infection through the Vagina and Uterus.** This will include the cases which are so frequently seen after incomplete abortions and puerperal sepsis generally, the gonorrhœal cases, and those complicating such diseases as submucous fibroids, polypi and carcinomata of the uterus, which have become infected from the vagina.

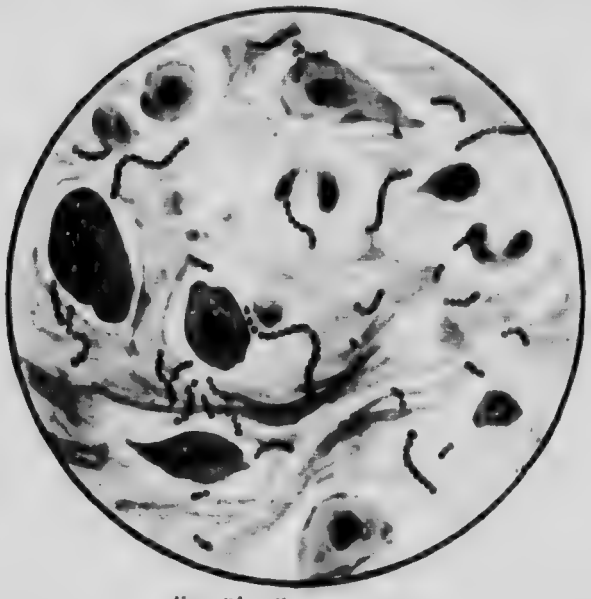


Fig. 91.—Streptococci.

The commonest organisms in the ascending infections are streptococci, staphylococci, and gonococci. Both tubes are usually infected equally (Figs. 91, 92).

This form is very rare in virgins.

(*b*) **Direct Infection from the Alimentary Tract.**—The vermiform appendix is here frequently at fault. It may be hanging over the brim of the pelvis, with its tip in close contact with the tube, or organisms may travel along the lymphatics towards the right ovary. The appendix is sometimes a cause of pelvic infection, importance of which has been recognized only since such cases of salpingitis have been treated by laparotomy. In cases in which the tube is infected from the appendix, the right side is most affected, so that at first the disease is unilateral; but the other tube may be subsequently infected, possibly by the organisms spreading across the uterine mucosa, or occasionally by the tube getting displaced

across the middle line to the opposite side. The usual organisms are a mixed coli infection. The bacillus coli may also come from the small or large intestine. This is especially likely to occur if an ovarian cyst becomes twisted: the twisted cyst becomes infected, and the tube suffers secondarily to the ovar

This form may affect virgins or parous women equally, but is rare.

(*c*) **Infection through the Blood-Stream.**—Tuberculosis is the only common example of this. The disease is bilateral, and usually affects virgins. Salpingitis has also been seen to occur during acute specific fevers, such as influenza and smallpox.

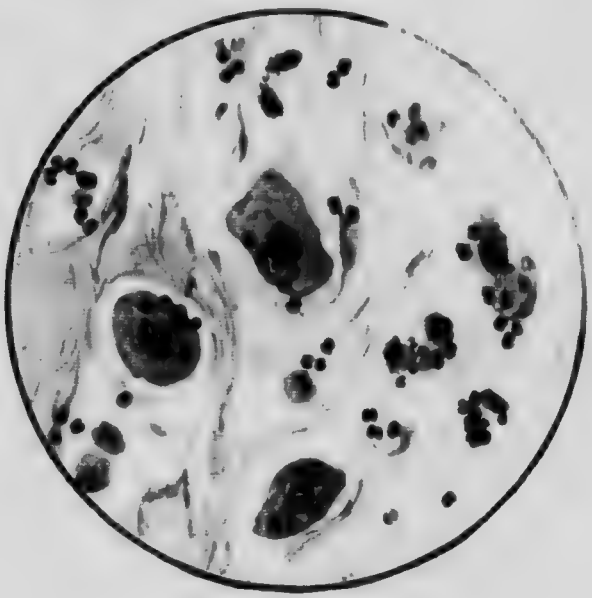


FIG. 92.—GONOCOCCI.

The Ætiology of Hydrosalpinx.—Hydrosalpinx is now usually regarded as resulting from catarrhal inflammation in which the fluid does not become purulent, or it may result from the accumulation of the normal secretion in a tube that is sealed up at its fimbriated end. That it is a result of inflammation is shown by the sealing up of the fimbriated end, and the presence of adhesions round it. It may communicate with a cyst of the ovary, forming a tubo-ovarian cyst.

SYMPTOMS.

The symptoms of an acute salpingo-oöphoritis are those of acute pelvic peritonitis (*q.v.*). The patient most frequently has had a septic incomplete abortion, or gonorrhœa, or appendicular colic.

She is then seized with acute pain in the lower abdomen, accompanied by rigidity and slight distension. Vomiting is frequent, and a rigor may occur. The pulse-rate is increased, and the temperature rises to about 103°. Owing to the pelvic congestion, leucorrhœa will certainly be present, and in a large number of cases metrorrhagia occurs. In the majority of cases the infection is limited to the tube by plastic adhesions, and so in these cases the symptoms abate at the end of a week or ten days; but there is a great tendency for relapses to occur, so that a history of repeated attacks is frequently obtained.

The symptoms of chronic salpingitis are chiefly menorrhagia, dysmenorrhœa, leucorrhœa, and pain in the back over the sacrum. Dyspareunia is sometimes complained of when the tubo-ovarian mass is fixed low down in the pouch of Douglas. Sterility is the rule with salpingitis, owing to the sealing up of the fimbriated extremities of the tubes. As a result of the various pains, the toxæmia, the loss of blood, and the continuance of the leucorrhœa, the patients frequently become neurasthenic, and so the clinical picture is complicated by the manifold symptoms of neurasthenia.

Signs.

During the acute stage the pouch of Douglas is filled with exudate resulting from the local peritonitis which the inflamed tube sets up, and the only diagnosis that can be made is that of "acute pelvis" or acute pelvic peritonitis, the cause of the peritonitis being undetermined till the exudate is absorbed.

In the subacute and chronic stages a pyosalpinx is felt as a tender, retort-shaped or convoluted mass extending out from the uterine cornu towards the side of the pelvis, and bending towards the posterior aspect of the uterus. Owing to the presence of adhesions and the thickening of the surrounding peritoneum and cellular tissue, the cervix is partially fixed. A pyosalpinx does not as a rule form a mass larger than 3 inches in diameter, and so is not usually palpable from the abdomen. Encysted serous exudate may form above the tube, and this, with the intestines which are adherent, may form a mass which is palpable above the pelvic brim. Occasionally a pyosalpinx, with or without matting of the surrounding structures, may form an abdominal swelling.

A hydrosalpinx may occasionally reach a considerable size and form an abdominal tumour, but is rarely more than 3 inches in diameter.

Diagnosis.

In the acute stage salpingitis may be mistaken for other lesions causing an exudate into the pouch of Douglas (see Acute pelvic peritonitis). In the stage when distended tubes are present, it has to be differentiated from an ovarian cyst. The latter is as a rule unilateral, more mobile, circular and not sausage-shaped, and does not limit the movements of the uterus, as adhesions are not present. There is also no history of acute pelvic inflammation, and fewer symptoms are present than in a case of pyosalpinx.

From a tubal pregnancy it may be extremely difficult to differentiate. A tubal pregnancy is unilateral compared with the double tubal tumour found in inflammatory cases. The blood-clot which forms a peritubal hæmatocele is more solid than the exudate round an inflamed tube, and resolves more slowly. The uterus is slightly enlarged, a decidual cast may be passed, and slight but continuous hæmorrhage occurs in tubal pregnancy; whereas in a case of salpingitis the uterus is not necessarily enlarged, no cast is passed, and, if bleeding is present, it will be the free loss which goes with pelvic congestion. There may be a history of a short period of amenorrhœa in cases of tubal pregnancy, but here it must be remembered that salpingitis frequently follows a septic early abortion, in which case there may be a period of amenorrhœa and enlargement of the uterus present, so that the two cases may be very similar to each other. In such cases sections should be cut of whatever is passed, the presence of chorionic villi indicating that an intra-uterine gestation had existed. The temperature may be raised in either case at the beginning of the attack if there is blood in the peritoneum, and is not of much help in diagnosis at this time.

An intraligamentary fibroid may have a superficial resemblance to a pyosalpinx, but is definitely part of the uterus, and other fibroids are usually present on the surface of the uterus. The history will also be quite different in the two cases.

A retroverted uterus will form a mass in the pouch of Douglas, but the body of the uterus will be absent from its usual place, and no tubal mass will be felt in the lateral fornices. Both conditions may be present at the same time.

Complications.

Rupture of the tube is rare in cases of pyosalpinx, owing to the thickening of the tube wall; if it does occur during the acute stage, general peritonitis ensues. Communications may form with adjacent viscera by the adherent part of the tube becoming eroded away. In

this way fistulæ are formed, which most frequently open into the bowel, usually rectum, very rarely into the vaginal vault.

Communication of a hydrosalpinx with a cyst of the ovary, resulting in the formation of a tubo-ovarian cyst, has already been referred to, but in addition to this the ovary is affected in other ways. Adhesions form round it, fixing it to the tube and broad ligament (peri-oöphoritis). This is in time accompanied by degenerative changes in the ovary, such as fibrosis, and the formation of small retention cysts. Pus infection of the ovary from a pyosalpinx is frequent. Small abscesses then form in the substance of the ovary, mostly in Graafian follicles or in corpora lutea.

Torsion of a distended tube is very rare, as it is fixed in its place by adhesions, but this complication has been recorded.

Prognosis.

In the non-suppurative forms this is good, and in the suppurative form, on the whole, it is also good as regards the life of the patient; for, except in cases of virulent infection, complicated by immediate general peritonitis and septicæmia, salpingitis is rarely fatal. But the chances of cure are not good, as palliative treatment leaves the patient with damaged viscera; and surgical intervention in many cases means removing one or both ovaries as well as the tubes, as they are frequently involved with the tube. An ovarian abscess, especially if of puerperal origin, has a more serious prognosis than a pyosalpinx.

Treatment.

The treatment of acute salpingitis is a subject on which there is some diversity of opinion. A large number of authorities hold that it is not advisable to operate on these cases during the earlier and acuter stages of the inflammation, except when general peritonitis is threatened or actually present, for it is established that in the majority of cases the inflammatory process becomes, or remains from the first, limited to the pelvis, and frequently spontaneously subsides to a greater or lesser degree, if time be given.

This result is in marked contrast to the course of pelvic peritonitis due to causes other than salpingitis, as, for instance, pelvic appendicitis, in which the danger of general peritonitis is great. Further, it is argued that by opening the abdomen, and disturbing the adhesions limiting the inflamed area, there is a risk of infecting the upper peritoneum and creating a general peritonitis.

Many patients with acute salpingitis, especially amongst the poorer classes, do not seek competent treatment until the inflam-

matory process is very far advanced, and pus has formed in the Fallopian tubes, the ovaries, or the pouch of Douglas. Many of these patients are acutely ill, and a difficult abdominal operation, involving much separation of adherent œdematous coils of intestine, is so serious an undertaking that it is considered better to wait till the acutest stage of the inflammation has spent itself and the patient has become more or less immunized against her own toxins.

Such cases, if operative interference cannot be delayed, may be dealt with by opening the pelvic abscess through the posterior vaginal fornix and inserting a drainage tube. This treatment is reported to suffice in many instances, but in others, owing probably to the fact that whilst draining the pus in Douglas's pouch it fails to reach that in the Fallopian tubes or ovaries, an abdominal section is subsequently required.

All cases of acute salpingitis do not, however, proceed as far as pus formation, and in these a spontaneous improvement may occur, until after the lapse of several weeks no trace of the inflammatory mass may be detectable by the finger. On the other hand, the recovery is often only partial, the appendage or appendages being left in a state of chronic thickening and tenderness.

These spontaneously subsiding cases may be treated with glycerine vaginal pessaries or douches of hypertonic saline solution to lessen the pelvic congestion and promote absorption of the inflammatory products.

In contradistinction to these views and methods are those of authorities who hold that the best treatment of salpingitis is to operate in the early stage of the attack, as is now the accepted practice in appendicitis.

Those who hold this view argue that were all these cases operated upon at once and the inflamed Fallopian tube or tubes removed or drained as the case may be by an india-rubber tube inserted into the pelvis, the formation of such serious conditions as a pyosalpinx, an ovarian abscess, or a large encysted collection of stinking pus in Douglas's pouch would be avoided, and the patient spared the days or weeks of fever and toxic absorption that she may have to undergo if the expectant line of treatment is followed, and the disorganization of the ovaries that follows an extensive and long-continued inflammation.

It is certain that the difficulties and severity of an operation performed at this early stage are very slight, compared with those of an abdominal section undertaken after the pelvis has been in a state of inflammation for many days or weeks, and that the ovaries can almost always be conserved, which is not the case when an

operation is undertaken late. An additional advantage claimed for the practice of early operations is that it puts out of court the possibility of treating a case of appendicitis under the mistaken notion that salpingitis and not appendicitis is present, for a certain diagnosis between these two conditions is often difficult or impossible.

Those who do not hold with early operations in cases of salpingitis argue that the practice means a sacrifice of many Fallopian tubes which, were expectant treatment adopted, would entirely recover and resume their functions of conveying ova to the uterus, and that there is no more justification for removal of every inflamed tube than there is for the removal of every inflamed epididymis; whilst those who urge immediate operation assert that in all probability an attack of salpingitis, even when slight, leaves the tube permanently occluded, functionless and useless. The question is not settled.

There is much less difference of opinion regarding the treatment of cases of subacute and chronic salpingitis. In the former, laparotomy is indicated when recurrent attacks of pelvic peritonitis occur (relapsing salpingitis) and when a mass persists in the pelvis accompanied by more or less pain in spite of treatment. In the latter, palliative or operative treatment may be required.

Palliative treatment consists of treating the symptoms which result from the pelvic inflammation and the hæmorrhage with ergot or other drugs such as calcium. If intestinal symptoms are present, a digestive tonic with or without bromides, will be useful.

General Remarks on Operative Treatment.—If laparotomy is performed, every effort should be made to conserve as much of the internal genital organs as may be possible. Thus, in cases operated on within a few hours or days of the onset, the pelvis may be simply drained and the Fallopian tubes not removed, though whether they become pervious after the attack is recovered from is thought by many authorities to be very problematical. In other instances, one or both of the Fallopian tubes will need removal.

The ovaries should not be removed unless they are the seat of pus formation. In very bad cases both entire appendages may have to be ablated, and in some instances the uterus with them. Such wholesale extirpation is, however, to be avoided whenever possible, for besides the mutilation, the operation is a severe one for a patient already exceedingly ill.

The method of draining a pelvic abscess by vaginal section has already been mentioned.

CHAPTER XXX

PELVIC INFLAMMATION

When organisms gain access to the pelvis, inflammatory changes may result in any of its structures. Occasionally the effects of the infection will be most marked in certain of the tissues, such as the pelvic peritoneum, the Fallopian tube, or the cellular tissue; but it will be obvious that no one structure is likely to be affected alone without some of the others being implicated. If, for example, the peritoneum forming the posterior leaf of the broad ligament is acutely inflamed, the parametric cellular tissue which lies immediately under that layer of peritoneum will be similarly affected; or if the infection has reached the pelvic peritoneum through the uterus, there must be some inflammation of the cervix and body of the uterus, and the tubes will be inflamed at the same time. Thus, it commonly happens that a patient is seen with an "acute pelvis" (comparable to the "acute abdomen"), in whom no exact diagnosis of the seat of the chief trouble can be given immediately; and it is only after the lapse of some time, if ever, that it may be possible to state what variety of pelvic inflammation predominates, or on which structures the bulk of the inflammatory process has fallen. This applies to the "acute stage" of pelvic inflammation. Frequently, however, there are reasons for thinking that the pelvic peritoneum is more affected than the cellular tissue, or *vice versa*, and this has led to the recognition of several subdivisions of pelvic inflammation which, in the past, have been described as separate clinical entities. Although a sharp division cannot be drawn between them in the acute stages, it is still convenient, for the purpose of clearness of description, to discuss the subject according to whether the pelvic peritoneum, the Fallopian tube, or the cellular tissue, is chiefly affected. Clinically it is found that the chief lesion is most often in the peritoneal cavity.

PERIMETRITIS OR PELVIC PERITONITIS.

Perimetritis is an inflammatory condition of the pelvic peritoneum.

Anatomy.

The peritoneum of the pelvis is continued down from the anterior abdominal wall on the urachus to the top of the bladder. It covers the upper and posterior aspects of the latter, and is then reflected on to the uterus. At least the upper three-quarters of the anterior wall of the uterus receives a peritoneal coat, while the lowest part and cervix is in contact with the bladder, and not covered by peritoneum. The peritoneum covers the whole posterior wall of the uterus, and extends down on to the posterior vaginal wall, which it covers for a distance varying considerably in different patients, but is usually about three-quarters of an inch in extent. It then forms the floor of the recto-uterine fossa or pouch of Douglas, and reaches the anterior wall of the rectum some 3 inches from the anus. A little higher up it covers the sides as well as the front of the rectum, and completely envelops the pelvic colon. The attachment to the uterus is firm, while that to the bladder is loose. It will be noted that, while the vagina receives no peritoneal covering in front, it is in contact with the pouch of Douglas for three-quarters of an inch or so behind, where the vagina is only separated from the abdominal cavity by the peritoneum and vaginal wall, which are about one-third of an inch in thickness.

At the lateral borders of the uterus, the layers of peritoneum which cover the anterior and posterior surfaces of that organ are continued outwards to the side of the pelvis in the form of a double layer of peritoneum which forms the broad ligament. The fimbriated extremity of the Fallopian tube pierces the peritoneum, which becomes continuous with the mucosa of the tube at this point, and forms a communication through the tube between the peritoneal cavity and that of the uterus. The ovary is covered by germinal epithelium, as the peritoneum only extends as far as the hilum of the ovary.

The posterior layer of the broad ligament is deeper than the anterior, so that the recto-uterine fossa (pouch of Douglas) is deeper than the vesico-uterine fossa, and therefore collections of fluid tend to collect in the former rather than the latter.

Varieties.

Pelvic peritonitis may be acute or chronic. The latter is usually a sequel of the former, but occasionally exists as a primary disease.

Cause.

The most common cause of pelvic peritonitis is salpingitis of bacterial origin. Before abdominal section was a common procedure, pelvic peritonitis was ascribed to cold, suppressed menstruation, or ovarian disease. It is now recognized that, although oöphoritis does exist, it is very rare as a primary disease, and usually occurs as part of a widespread pelvic lesion which involves the Fallopian tube and pelvic peritoneum as well, and that, as a rule, the ovary is infected secondarily to the tube.

The reason why the tube tends to infect the peritoneum is that the opening at its uterine end is so minute that it easily becomes closed if inflammatory swelling of the mucosa occurs; hence any exudate which forms in the lumen of the tube will tend to drip out of the fimbriated extremity and infect the ovary and the surrounding peritoneum.

The vermiform appendix may hang over the brim of the pelvis and be the cause of a pelvic abscess, or may infect the right tube by means of the lymphatics. The appendix is such an important and frequent cause of pelvic inflammation that appendicitis must always be considered, especially in cases of right-sided pelvic peritonitis.

A twisted ovarian cyst becomes congested, hæmorrhage occurs into it, and it easily becomes infected by organisms from the surrounding intestine. A hæmatocele may become infected in a similar way. Pus formation in either case is rare. A cancer of the uterus which has eroded the uterine wall, growths or ulcers of the rectum, and ureteric calculi, are occasional causes. An abscess tracking down from above may cause symptoms which are most marked in the pelvis, the pus finding its way from the upper abdomen to the pelvis by gravity. After an operation for general peritonitis (*e.g.*, from a ruptured gastric ulcer) the Fowler position, which is usually adopted, favours this occurrence.

An abscess originating in disease of the pelvic joints may also burst internally. In rare cases the pouch of Douglas may be directly infected by an unclean instrument perforating the uterus or vaginal vault in cases of criminal abortion or in unskilful attempts to dilate and curette a uterus, especially if the latter is weakened by carcinoma.

Pathology.

The earliest stage of pelvic peritonitis is congestion of the peritoneum, which loses its glistening appearance and becomes dull and slightly rough. Lymph exudation takes place, which increases the roughness and causes the adjacent organs to become adherent. Thus adhesions form between the tube, the posterior wall of the uterus and broad ligament, the ovary, the rectum, cæcum, appendix, pelvic colon, small bowel, and omentum. Such adhesions are protec-

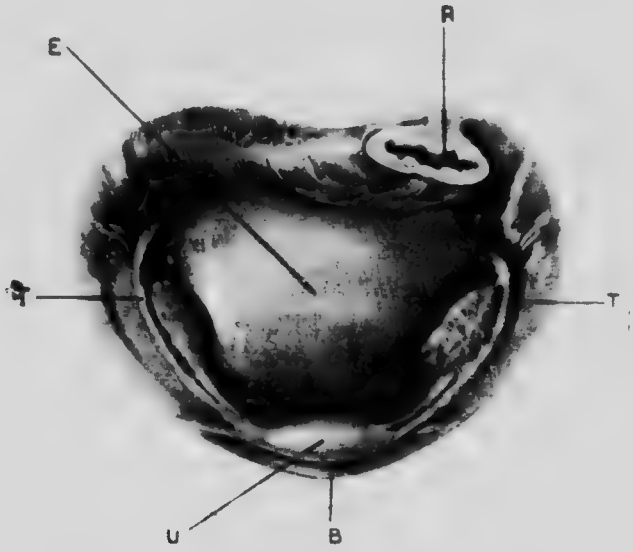


Fig. 93.—Effusion into the Pouch of Douglas as seen from Above (Diagrammatic).

The effusion presses the uterus forwards and upwards, and the rectum backwards. When the effusion is the result of salpingitis, the distended tubes and adhesions partly cover the exudate. The coils of small intestine which roof in the exudate have been removed. *B*, Bladder; *E*, effusion; *R*, rectum; *U*, uterus; *T*, Fallopian tube, represented without signs of obvious disease.

tive in nature, and by cutting off the general peritoneal cavity they tend to limit the inflammation to the pelvis. This is desirable, as it has been shown experimentally that the absorption of toxic material is less rapid in the pelvis than it is higher up. Cases in which the inflammation is spreading too rapidly for adhesions to form are much more fatal than the more common adhesive form.

Serum and lymph are poured out between and below the adhesions, and collect chiefly in the pouch of Douglas. The tissues

round become œdematous, and cellulitis of the subperitoneal connective tissue also occurs. This exuded fluid may become absorbed or may become purulent. If the latter occurs, the swelling becomes larger and the mucosa of the vagina and rectum becomes œdematous, and finally the abscess bursts, usually into the rectum. In rare instances it may extend upwards and cause general peritonitis, but this is very rare once adhesions have roofed in the pelvis. If absorption takes place, the mass gets smaller, and consists of the

FIG. 94.—TO SHOW EFFUSION INTO POUCH OF DOUGLAS IN ACUTE PELVIC PERITONITIS (SEMI-DIAGRAMMATIC).

The uterus is pushed forward by the effusion, which causes a marked fullness in the posterior vaginal fornix. The Fallopian tubes lie on the upper surface of the effusion, which may be serous or purulent, and is roofed in by the small intestine.

thickened peritoneum and adherent lymph, together with the adjacent viscera (usually the tube and ovary). Finally, the œdema and thickening of the peritoneum disappear more or less completely, and the patient is left with adhesions of varying density. These adhesions may have important and serious effects, as in their contraction they displace the viscera to which they are adherent. Thus, the fundus of the uterus may be bound down to the posterior wall of the pelvis, and retroflexion and retroversion are produced; the

intestines may be displaced downwards, and bands may form to the omentum and other organs, which subsequently may cause strangulation of the small bowel; and, perhaps most frequent of all, the fimbriated end of the Fallopian tube becomes sealed up by the plastic lymph and united firmly to the ovary, the tube itself frequently forming a pyo- or hydro-salpinx. The thickened tube and ovary form a mass behind the uterus which may be palpable long after the attack has subsided.

Symptoms.

The symptoms usually present are pain, fever and abdominal distension.

Pain is more prominent than in a case of parametritis. It is situated in the lower abdomen; though often in the early stages it is near the umbilicus, and subsequently becomes located lower down, just above the pubes. The pain is severe, and increased on movement, hence the patient usually takes to her bed. Pain in the back over the sacrum may be present. There is sometimes hyperæsthesia of the skin above Poupart's ligament.

The onset of the disease is acute, and the temperature is on the whole higher than in parametritis. A rigor sometimes occurs at the onset, and may be repeated. The pulse-rate is proportionately raised.

Abdominal distension and difficulty in obtaining an action of the bowels are usual.

Signs.

The patient usually lies in bed with both knees drawn up, in order to lessen the strain on the muscles of the abdominal wall. The abdomen is distended, and the muscles over the lower part resist any attempt at deep palpation. If a mass is palpable above the pelvic brim, it is usually irregular in shape, and partly resonant on percussion, because it is formed of bowel adherent around exuded fluid and thickened omentum. If a twisted ovarian cyst or a hæmatocele is present as well, the swelling will be larger and more definite.

On vaginal examination, in the acute stage, the uterus is frequently found pushed forward by a mass in the pouch of Douglas. This mass pushes down the posterior fornix and obliterates it, and extends in a less marked manner into the lateral fornices. The cervix is not freely movable, but is not as absolutely fixed as when parametritis is the chief lesion (Figs. 93, 94).

The exuded fluid, lymph, and thickened peritoneum, in the

pouch of Douglas, obscure what is above, and prevent palpation of the deeper structures. Thus, at this time it is impossible to state the exact condition present, and whether there is tubal enlargement or not. The whole pelvis is tender to palpation, and vaginal discharge, which may be mixed with blood, is frequently present. After about a week, when the exuded fluid is becoming absorbed, the mass in the pouch of Douglas becomes less prominent, and permits palpation of the pelvis. If an inflamed tube is the cause of the perimetritis, it now becomes palpable as an oval or retort-shaped mass running out from the cornu of the uterus to the neighbourhood of the sacro-iliac joint. The tube may be curved on itself and meet the opposite tube in the middle line behind the uterus. If the ovary is cystic, the tubo-ovarian swelling may be felt between the two hands in a bimanual examination; but extreme gentleness is necessary, owing to the risk of breaking down adhesions and disseminating infection.

Diagnosis.

Hæmatocele.—It is often difficult, and may be impossible, to differentiate between these two conditions, except by the history and by watching the progress of the case. In a typical case of hæmatocele there will be a history of five to eight weeks' amenorrhœa, followed by a sudden attack of pain and signs of anæmia, which the slight vaginal hæmorrhage accompanying a hæmatocele will not account for. In pelvic peritonitis, if due to a septic abortion, the history may be somewhat similar; but at the time of the abortion there will be more vaginal hæmorrhage than in an ectopic gestation, and the anæmia present corresponds with the amount of the vaginal hæmorrhage. In both cases the temperature is raised, but in the hæmatocele the fever is usually transient, and the mass in the pouch of Douglas soon assumes a doughy consistence, due to the clotting of the blood, and later on becomes lumpy. Rarely a hæmatocele may become infected, and may itself be a cause of pelvic peritonitis.

Pelvic Cellulitis.—This usually follows full-time labours complicated by cervical lacerations, whereas pelvic peritonitis is more frequent after infected abortions. In the cases of peritonitis the onset is more acute, the patient more gravely ill, pain and vomiting more marked, and the lower abdomen more rigid than in the parametritic inflammations. In the peritonitic cases, also, the cervix is less fixed, and the uterus is not as much pushed to the opposite side of the pelvis as in parametritic ones. On rectal examination,

thickening is felt only in front in cases of pelvic peritonitis, because the peritoneum only covers the rectum on its anterior wall; whereas in a case of pelvic cellulitis there is a horseshoe-shaped induration round the front and both sides of the rectum. Occasionally well-marked signs of both diseases are present in the same patient, but in general it may be stated that pelvic cellulitis tends to be a unilateral disease with unilateral symptoms and signs, while pelvic peritonitis is central or bilateral.

Appendicitis.—Cases in which the vermiform appendix is involved either alone or together with the right Fallopian tube are on the whole more serious than other cases, as general peritonitis is more frequent and early operation is indicated. Such cases are difficult to diagnose with certainty, but help may be obtained from the following points: In an appendicular attack the patient as a rule is more ill in herself, gastro-intestinal symptoms, such as vomiting, are more marked, and the tongue is more furred. The pain and rigidity are more unilateral, and on vaginal examination the mass may be more on the right side, whereas in a case of infection from the uterus the trouble is bilateral and symmetrical.

Prognosis.

The mortality is not high, but the after-effects are serious. Sterility from the changes which occur in the tubes is frequent, and adhesions to the bowel may cause fatal strangulation at a subsequent period. Occasionally the condition seems to clear up completely, but more often the symptoms of chronic pelvic peritonitis supervene.

Treatment.

Perimetritis can be prevented in a large proportion of the cases by rigid asepsis and careful treatment of abortion and labour, also by efficient treatment of gonorrhœa before the infection has spread up to the uterus and tubes. A certain number of cases can be prevented by removing the diseased vermiform appendix before it gives rise to suppuration round it.

Once the disease is established, the methods of treatment correspond to those adopted for appendicitis and other similar conditions giving rise to peritoneal inflammation, except that they are modified by the special considerations affecting infections in the pelvic cavity. As has already been pointed out, such infections are more quickly and more completely localized than other peritoneal inflammations, owing to their anatomical situation. They are confined to the pelvis by being shut in below by the uterus and broad

ligaments, and by the roofing in of the pelvic cavity by bowel and omental adhesions. Excepting the virulent puerperal and post-abortion infections, the infecting organisms have not, as a rule, the virulence of the pyogenic organisms that cause appendicitis. This is especially true of the gonococcus, which is the cause of a certain number of cases of peritonitis. A gangrenous condition of the tube corresponding to that seen in a fulminating appendicitis is not known. Also the absorption of toxic products from the pelvic peritoneum is neither so free nor so rapid as from the upper portions of the peritoneal sac, and hence the general intoxication is not so serious.

Clinically it is found that a large proportion of cases subside under palliative treatment, and that very few end in general peritonitis. Also, if an operation is done during the acute stage, the adhesions that have limited the infection to the pelvic cavity have to be broken down and the infected material removed through the abdominal incision, which must involve some risk of spreading the infection. Thus, owing to anatomical and pathological peculiarities, pelvic peritonitis, especially if of tubal origin, as a rule must not be treated quite on all fours with appendicitis; the urgency is less, the organs affected are of greater value if saved, and the prospects of complete recovery are so much greater that a more expectant attitude in regard to operation is justified.

There is a general consensus of opinion that, with certain exceptions, acute attacks of pelvic peritonitis are best treated by palliative measures in the first instance.

As a rule, when a patient is seen in the acute stage of pelvic peritonitis, with a mass of exudate in the pouch of Douglas, the usual treatment is to relieve pain by hot fomentations to the lower abdomen, and hot (115° F.) douches for the vagina; the latter should be given slowly, so that the hot fluid may act for as long a time as possible. They wash away any discharge which may be present, relieve pain, and stimulate the pelvic circulation. The pain may be sufficiently severe to require morphia. Strong purgatives should be avoided, for fear of breaking down protective adhesions during the first few days.

Under such palliative treatment as the above the majority of patients, especially those with gonorrhœal infection, recover completely, and not only escape recurrence, but even obtain a restoration of function in the tubes, as proved by the subsequent occurrence of pregnancy. As these patients will nearly all show some thickening in the pelvis (especially in the region of the tube) for some time after the acute attack, it is evident that the only way to avoid

unnecessary operations is to give time for the natural process of repair to take place, and to interfere only in unfavourable cases where there is definite indication for interference. Instead of improving under palliative treatment, a certain proportion of cases go on to the formation of a pelvic abscess; this occurrence is indicated by the persistence or recrudescence of the fever, the increase of the pelvic mass, and œdema of the rectal or vaginal mucosa over it. In some cases, the first definite sign that pus is present is a sudden gush of it from the rectum into which the abscess has burst. If left alone, this would occur in the majority of cases, as it is rare for the abscess to point upwards to the general abdominal cavity. It is, however, as unsurgical to leave abscesses to burst in the pelvis as it is elsewhere, because the patient's condition, both general and local, suffers before they do so. The best route for the evacuation of a pelvic abscess is through the posterior vaginal fornix, and this is the treatment to be adopted as soon as the existence of a pelvic abscess is diagnosed. The patient is put in the lithotomy position and the vulva and vagina purified. A speculum is put in to retract the perineum. The cervix is steadied with a vulsellum, and a spot on the posterior vaginal wall chosen just clear of the cervix and absolutely in the middle line (so as to be away from the uterine vessels and ureters, which lie at the side of the cervix), and a transverse incision an inch long is made into Douglas's pouch. If pus is not reached at once, the finger may be inserted and the abscess cavity located.

The abscess being evacuated, a flanged drainage-tube similar to that used for draining empyemata, but with a longer tube, should be put in. Hæmorrhage from the cut vaginal wall is usually slight, but if troublesome can be checked by a temporary plug of gauze. The abscess cavity can subsequently be irrigated through the tube.

The cases in which it is agreed that laparotomy is immediately necessary are those apparently due to appendicitis, those due to salpingitis which resist palliative treatment during the acute stage, the intensely toxic cases with a falling temperature but a rising pulse-rate, and cases in which the inflammation seems to be spreading upwards and infecting the general peritoneal cavity. Such cases of salpingitis are quite exceptional. It may be mentioned that, if it seems probable that the tube and appendix will both have to be removed, it is easier to do the operation through a median incision than through the usual appendicectomy incision.

Should the abdomen be opened in a case of acute pelvic peritonitis—for instance, in cases in which the vermiform appendix is involved, or in cases mistaken for ectopic gestation—the general

peritoneal cavity must be thoroughly packed off before beginning to loosen adhesions, the Trendelenburg position should be avoided as much as possible, and the abscess dried out rather than washed out, as the irrigating fluid may flow upwards and carry infection towards the diaphragm. After the abscess and its cause have been dealt with, vaginal drainage should be established by getting an assistant to pass a pair of forceps into the posterior fornix so that its position can be seen from above, and then cutting down on to it from above. The forceps not only indicates exactly the position of the top of the posterior fornix, but can be used to draw down a drainage-tube through the hole. The abdomen is then closed with or without drainage through the abdominal incision, and immediately the operation is finished the patient must be propped up in bed in the Fowler position, and saline solution be slowly administered *per rectum*. As the abscess cavity may be continuous with the Fallopian tube or a suppurating ovarian cyst, a sinus resulting from such an abscess may remain open for a very long time unless the infected viscus is removed.

The presence of a persistently virulent focus of infection may sometimes be shown by the occurrence of an attack of acute or subacute pelvic peritonitis after an attempt to replace a fixed retroverted uterus, or even after a bimanual examination. Most important of all as an indication for laparotomy is the occurrence of repeated attacks ("recurrent salpingitis") after the original attack has long cleared up.

Thus it will be seen that, in cases of the first attack of acute pelvic peritonitis of salpingitic origin, most operators wait for some weeks after the acute symptoms subside, and usually operate only for a recurrent attack or for the removal of a persistent palpably enlarged tubal mass, probably containing pus. A smaller number of surgeons operate, more frequently, as soon as the acute symptoms subside, if there is then evidence of tubal enlargement.

It must be borne in mind that salpingitis is not the only cause of acute or subacute pelvic peritonitis. Experience shows that if salpingitis is the cause the inflammation is almost invariably limited to the lower part of the peritoneal cavity, except in rare cases of gonococcal origin in which no protective adhesions are developed. In most cases of pelvic peritonitis the history and the physical signs establish the diagnosis that the pelvic inflammation is due to tubal infection. In these, expectant treatment is indicated, no operation being performed, except for the evacuation of an abscess, until acute symptoms have subsided, and not then unless one of the indications given above is present. Other causes that must be con-

sidered are appendicitis, a small inflamed ovarian cyst, and rarer conditions such as diverticulitis and perforation of a stercoral ulcer. In appendicitis, general peritonitis is much more likely to occur than in salpingitis, and even if the inflammation becomes localized an operation is usually indicated. If an infected ovarian cyst is the cause of the pelvic inflammation, an operation is imperative, the sooner the better, although in some cases the acute symptoms pass off, leaving persistent pain and invalidism, which can be cured only by an operation. In cases of diverticulitis and perforation of a stercoral ulcer there can be no expectation of improvement without an operation. In cases of an infected hæmatocele a wrong diagnosis is made occasionally, the condition being attributed to a pelvic abscess secondary to salpingitis. The mistake is fortunately of little importance if the correct treatment is carried out—viz., evacuation by the vaginal route.

In cases of pelvic peritonitis in which the diagnosis is doubtful—and in practice it is found that this resolves itself into doubt whether an acute or subacute attack of inflammation is due to appendicitis or to salpingitis—it is best to operate so as to be on the safe side.

The treatment of chronic pelvic peritonitis is discussed on p. 254.

CHAPTER XXXI

PELVIC INFLAMMATION—*Continued*

CHRONIC PELVIC PERITONITIS.

This is the sequel to an attack of acute or subacute peritonitis: and, as the usual cause of such attacks is tubal inflammation, the term "chronic pelvic peritonitis" is usually almost synonymous with "chronic salpingitis." Some tuberculous cases are chronic in character throughout their course.

Pathology.

The wall of the Fallopian tube is thickened from chronic inflammation; if the fimbriated extremity is closed up, the fluid in the tube cannot escape into the peritoneal cavity, and so collects in the lumen of the tube, forming a chronic hydro- or pyo-salpinx of varying size. If, however, the abdominal ostium is not closed, the tube does not become distended with fluid. The ovary is usually adherent to the tube, and both are bound down to the posterior aspect of the broad ligament. The peritoneum forming the broad ligament is thickened, and adhesions are present which run from the neighbourhood of the tube to the opposite tube, the rectum, the uterus, the small and large intestine and omentum. The uterus is frequently dragged backwards into a position of more or less marked retroversion.

Symptoms.

The symptoms are chiefly those due to the resulting pelvic congestion, and to the infection of the cervix and body of the uterus which frequently coexists.

Menstrual Disturbances.—The periods usually last longer, and the loss is greater than before. Acquired dysmenorrhœa is complained of; it is of the congestive type, and is relieved after the first day or two of the flow.

Leucorrhœa is troublesome, and is usually increased after the menstrual period ends.

Pain.—In addition to the dysmenorrhœa, there is constant dull pain in the region of the lower lumbar vertebræ; and if the ovaries and tubes are adherent low in the pouch of Douglas, or if the uterus is fixed in a position of retroversion, internal dyspareunia may be present.

Effects on Gestation.—Owing to the frequency with which the fimbriated ends of the tubes are sealed up, sterility is common, although the Fallopian tube sometimes becomes functional and pregnancy ensues after symptoms pointing to bilateral salpingitis have existed. If the patient does become pregnant, the retroversion, if present, may persist, and the condition known as incarceration of the retroverted gravid uterus may ensue. Although the perimetritic adhesions become stretched as the uterus enlarges, they are a predisposing cause of miscarriage. The unhealthy condition of the tubal mucosa following salpingitis has been thought to predispose to the occurrence of ectopic pregnancy.

It is not to be expected that all the above formidable list of symptoms will be present in every case; as a rule one symptom is predominant, and the others are only slightly marked, or may be entirely absent. Occasionally very definite physical signs of chronic pelvic peritonitis are found in patients who complain of no symptoms at all. Patients with chronic pelvic inflammation are liable, at intervals, to recurrent exacerbations of the disease, resembling an attack of acute pelvic peritonitis. These attacks may be due to a secondary coli infection or to an exacerbation of the virulence of the organisms originally present.

The patient becomes in time anæmic, because of the menorrhagia; and owing to the constant pain and dysmenorrhœa, and the mental anxiety resulting from the sterility and leucorrhœa, it is not surprising that after a longer or shorter time she becomes a victim to general neurasthenia, so that in addition to the symptoms that are directly due to her pelvic condition there are also complaints of vague gastric and general symptoms, which are finally made more of than the local symptoms, and may detract attention from the original cause of the illness.

Diagnosis.

This depends on finding a partly fixed mass in one or both postero-lateral quarters of the pelvis, with thickening of the peritoneum round it and more or less marked fixation of the uterus (see Pyosalpinx).

Prognosis.

This is good as regards life, although the great liability of a patient with a chronic pelvic lesion to suffer from recurrent acute attacks must be remembered. But the prognosis as regards absolute cure is very poor, as even early operative treatment will not restore the original condition of the organs, and some symptoms—*e.g.*, sterility—will probably be incurable.

If treated efficiently and early, a good deal can be done to improve the patient's condition; but too frequently such patients only come for advice when a state of confirmed neurasthenia is established, and then the results of treatment are disappointing.

Treatment.

As no known therapeutic measures will satisfactorily alter the actual results of the acute inflammation, the treatment is to be directed to alleviating the symptoms. The congestion of the pelvis must be relieved by treating the constipation which is frequent in these cases; while constipation exists no improvement can be looked for, and petroleum, laxatives (rhubarb, cascara, and others), exercises, and abdominal massage, may be found useful. For two days before the onset of menstruation a Seidlitz powder or other saline purge may be given each morning to produce a watery evacuation of the bowels, and thus counteract the premenstrual engorgement of the pelvic organs. This will be found to relieve considerably the dysmenorrhœa, and any pain which persists may be treated with coal-tar remedies in the usual way. Hot vaginal douches will be useful both to remove the leucorrhœa and stimulate absorption of inflammatory exudate. Glycerine pessaries or wool tampons dipped in glycerine, or glycerine with 10 per cent. ichthyol, are used for their dehydrating action. A digestive mixture or tonic containing iron may be used, according to the condition of the patient. If recurrent attacks occur, or if examination shows the presence of a persistent pelvic swelling, operation should be advised.

It may be well to call attention to the risks attending curetting for menorrhagia, when there is any evidence of pelvic inflammation. Such a procedure may be the cause of a fresh outbreak of pelvic inflammation.

CHAPTER XXXII

PELVIC INFLAMMATION—*Continued*

PELVIC CELLULITIS (PARAMETRITIS).

Definition.

Pelvic cellulitis, or parametritis, is an inflammatory condition of the connective tissue of the pelvis.

Anatomy.

The pelvic cellular tissue is continuous with the retroperitoneal connective tissue of the upper abdominal cavity. In the pelvis it forms a continuous layer covering the pelvic viscera under their peritoneal coats, and where the peritoneum forms false ligaments the connective tissue forms a considerable portion of the so-called ligaments. Thus the greater part is collected round the cervix in the broad ligaments and in the utero-sacral folds. Starting from the cervix, the largest mass is in the broad ligaments, and a smaller amount in front at the base of the bladder; posteriorly it runs backwards in the utero-sacral folds, and then envelops the rectum both in front and on either side. It is also continued as a delicate sheath along the vessels and nerves which pass out of the pelvis, and spreading upwards joins the large mass of tissue surrounding the kidney by a fine sheath which it gives to the ureter. In a similar way it is continued upwards to the subperitoneal tissue of the anterior abdominal wall.

Below, its limitations are strict; it is cut off from the ischio-rectal fossa by the pelvic fascia and the levator ani, and can only reach the exterior by passing along the vessels which pierce it. In the non-pregnant pelvis the cellular tissue is very largely cut off from above and entirely cut off from below. It is situated almost entirely below the pelvic brim. During pregnancy, on the other hand, the enlarging uterus carries up the broad ligaments till they lie above the pelvic brim. Loose connective tissue fills up the spaces where the peritoneal reflections from the uterus previously existed; thus, at the end of pregnancy, the connective tissue is greatly increased in amount, and it is also raised up so that part is above the pelvic brim.

Cause.

The cause of the inflammation is in all cases infection with micro-organisms. The usual channel by which the infection reaches the cellular tissue in the female pelvis is from a laceration of the cervix. Therefore in any case of parametritis these two ætiological factors should be sought for.

During labour the cervix tends to be lacerated by the child's head; hence pelvic cellulitis is more likely to follow full-time labour than abortion, because the child's head is bigger in the former. Owing to the larger percentage of cases in which the projecting occiput is to the left, the tear is more likely to be on that side, and it is found that parametritis is most frequently left-sided. Lacerations most commonly follow difficult instrumental labours, especially when the first stage is hurried by mechanical means.

Although puerperal patients form by far the greater number of all cases of inflammation of the pelvic cellular tissue, it may also follow the passage of large polypi through the cervix, the removal of fibroids by vaginal myomectomy, and the operation of dilatation. As operations are now always performed with aseptic precautions, the non-puerperal form is very rarely seen, except occasionally as the result of the extensive opening up of the cellular tissue after a radical operation for a septic carcinoma of the cervix. The usual means of carrying infection into the cellular tissue is by the lymphatic vessels; very rarely, in cases of incomplete rupture of the uterus, the infection may be direct.

In addition to the above, there are other conditions which may occasionally cause infection of the pelvic connective tissue in the female as in the male, such as ulceration or new growth of the rectum or bladder, and disease of the appendix or pelvic joints.

Chronic inflammation of the cellular tissue is not a primary disease, but occurs as part of recurrent attacks of pelvic inflammation. In such cases it is mainly confined to the upper part of the broad ligament. The term is also given to the thickening which is occasionally left from an acute case after it has subsided either with or without suppuration.

Pathology.

The pathological changes are exactly similar to those of cellulitis in any other part of the body. The first change is an exudation of coagulable lymph, so that the tissues become brawny and hard. This may go on to suppuration or may become absorbed. As the organisms present in puerperal cases are virulent, suppuration is frequently seen.

Symptoms and Signs.

According to the severity of the infection, the symptoms may start from two days to about two weeks from the date of the cervical laceration.

There is a rise of temperature which may commence with a rigor, although repeated rigors are unusual. The pyrexia is moderate, and averages about 102° F.

Pain is usually late in onset, and is only marked in cases in which there is much coexisting peritonitis present. Hence, unless the rise of temperature causes a local examination to be made, the existence of a cellulitis may not be thought of.

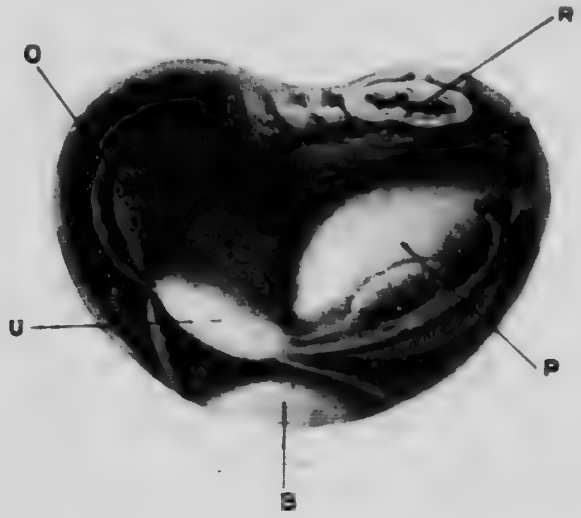


Fig. 95.—To show Position of Viscera in a Case of Left-Sided Parametritis. The uterus is displaced towards the right. The Fallopian tubes and ovaries are healthy. *B*, Bladder; *O*, ovary; *P*, parametric exudate; *R*, rectum; *U*, uterus.

The formation of a mass on the infected side will be determined by the distribution of the connective tissue, and is mostly found in the base of the broad ligament. The mass will push the uterus over to the opposite side, and may depress one lateral fornix. As the rest of the cellular tissue round the cervix is certain to be more or less affected, the cervix will be surrounded by a hard mass of inflamed oedematous tissue which fixes the cervix immovably in the

pelvis. Owing to the presence of connective tissue on three sides of the rectum, there will be thickening in front and also laterally. This horseshoe-shaped exudate is characteristic of the condition. In non-puerperal cases no mass is palpable in the abdomen as a rule, but in puerperal cases the exudate can be felt as a firm mass just under the abdominal wall, in contact with the inner half of Poupart's ligament, and perhaps extending into the iliac fossa (Fig. 95).

If the inflammation reaches the psoas muscle, the patient will keep the leg on the affected side flexed so as to relax the psoas. This attitude in bed is sometimes helpful in diagnosis.

Course of the Disease.

Should absorption of the mass take place, the convalescence will be slow if the exudate to be absorbed is a large one. If suppuration occurs, it will not be easy to determine this early, owing to the thickness of the brawny layer of inflamed tissue that surrounds the central abscess, and the depth of the suppurating centre.

The patient with a deep-seated parametritic abscess soon shows the usual signs of toxæmia, and becomes gravely ill. Anæmia and slight icterus are present, there is loss of appetite, sometimes diarrhœa, the patient sweats and wastes rapidly, and consequently bedsores may occur if she is not carefully nursed. The cellulitic abscess, if left to itself, points most frequently above Poupart's ligament, especially in puerperal cases. If the abscess is lower down in the pelvis, as in some non-puerperal cases, it may burst into the rectum or bladder, or less frequently follows the sciatic and gluteal arteries to the buttock, the ureter into the loin, the obturator artery into the groin, or the femoral artery into the thigh. It is said to open into the vagina, but this must be extraordinarily rare.

Diagnosis.

This depends on the discovery of the pelvic mass associated with fever and slight pain, and usually occurring a short time after some injury to the cervix. It has to be differentiated from cases in which the pelvic peritoneum is chiefly affected, and which are much more frequently seen (*q.v.*).

The position of the swelling is most important. If it is present not only at the side of the uterus, but also forming a horseshoe-shaped constriction of the rectum, there should be no difficulty in diagnosis.

Where the mass is present only at the side of the pelvis, and is

palpable above Poupart's ligament, it has to be differentiated from a broad-ligament cyst, which is accompanied neither by fever nor signs of inflammation; and also from a psoas abscess, in which case the primary spinal disease should give definite signs of its existence. The rare cases pointing in the buttock and thigh must be diagnosed from disease of the joints. It must also be differentiated occasionally from fibroids involving the broad ligament, an ovarian abscess burrowing under the broad ligament, and carcinoma of the ovary or pelvic colon, but the commonest error is to mistake an intraperitoneal collection of pus or a pyosalpinx or ovarian abscess of puerperal origin for a suppurating cellulitis. The reason of this is that these collections of pus are hooded over by the broad ligament and appear to be in its substance.

Prognosis.

If the infection is limited to the pelvic cellular tissue, the condition is only fatal when occurring as a part of dissecting suppuration which spreads extensively along the planes of cellular tissue. If unaccompanied by salpingitis, the occurrence of a parametritis is no bar to subsequent pregnancy. Owing to the absence of adhesions to other organs, there are less sequelæ to parametritis than to other forms of pelvic inflammation.

Treatment.

In the case of parametritis, a good deal can be done in prophylaxis by rigid asepsis in all pelvic operations, and by avoiding as far as possible those methods of treatment which involve lacerations of the cervical canal.

In the early stages of the disease the patient should be given general treatment in the matter of diet and regulation of the bowels, such as would be suitable for any febrile patient.

Locally, if pain is present, fomentations or hot-air baths may be applied to the lower abdomen, and vaginal douches at a temperature of about 115° F. given very slowly, as a kind of internal hot fomentation to stimulate the local circulation. Pessaries of glycerine with or without the addition of some mild antiseptic are sometimes used to extract fluid, and thus deplete the congested pelvis. Douches of hypertonic saline solution may be used for the same purpose.

Fluctuating temperature, wasting and anæmia, the mass not getting smaller, and the presence of œdema and softness over Poupart's ligament, make it probable that suppuration has taken place, and, naturally, surgical intervention is desirable as in other collections of pus. It is difficult to feel fluctuation early, as

these abscesses lie below several inches of vascular brawny tissue: for the same reason it is difficult to locate them when operating. The best incision is over the most prominent part of the swelling, and this is usually just above Poupart's ligament. After incision the exact position of the pus may be located by Hilton's method with some blunt instrument, and then a drainage-tube inserted, with or without counter-drainage through the vagina.

Care must be taken to prevent bedsores and to have the knee and hip repeatedly moved to prevent fixation; but once the abscess is freely opened the patient rapidly gets well.

CHAPTER XXXIII

VENEREAL DISEASES: SYPHILIS, GONORRHŒA, SOFT CHANCRE

The word "venereal" is applied to three diseases: syphilis, gonorrhœa, and soft chancre. Of these, the last is a purely local affection, which does not cause constitutional symptoms or affect viscera, and is not transmitted to the offspring; whereas untreated syphilis does all three of these things in addition to being a local affection. Gonorrhœa may affect the patient only locally, or may cause disease of adjacent or distant viscera (see pp. 272, 273). It affects the child only during its passage through the birth canal; but during this short time the infant's eyes may become infected, and thus subsequent incurable blindness may result.

Syphilis and gonorrhœa each have a threefold importance: first, as a disease which affects the patient both locally and constitutionally; secondly, by tending to cause sterility, abortion, or the expulsion of a macerated fœtus; and, thirdly, by affecting the child in such a way that, although born alive, by the possibility of the child being affected, it may be unhealthy or useless as a national asset.

The importance of these two diseases is such that a Royal Commission was appointed to investigate them in 1913. It is from their report (published in 1916) that some of the following statements are abstracted.

The prevalence of these diseases is difficult to estimate with certainty, but there are reasons for thinking "that the number of persons who have been infected with syphilis, acquired or congenital, cannot fall below 10 per cent. of the whole population in large cities, and the percentage affected with gonorrhœa must greatly exceed this proportion." In rural districts the figures are much smaller. For example, the incidence of ophthalmia in children in London is given as 6 per 1,000 births, but in rural districts alone it is only 1 per 1,000.

The patient's ignorance of the serious and contagious nature of

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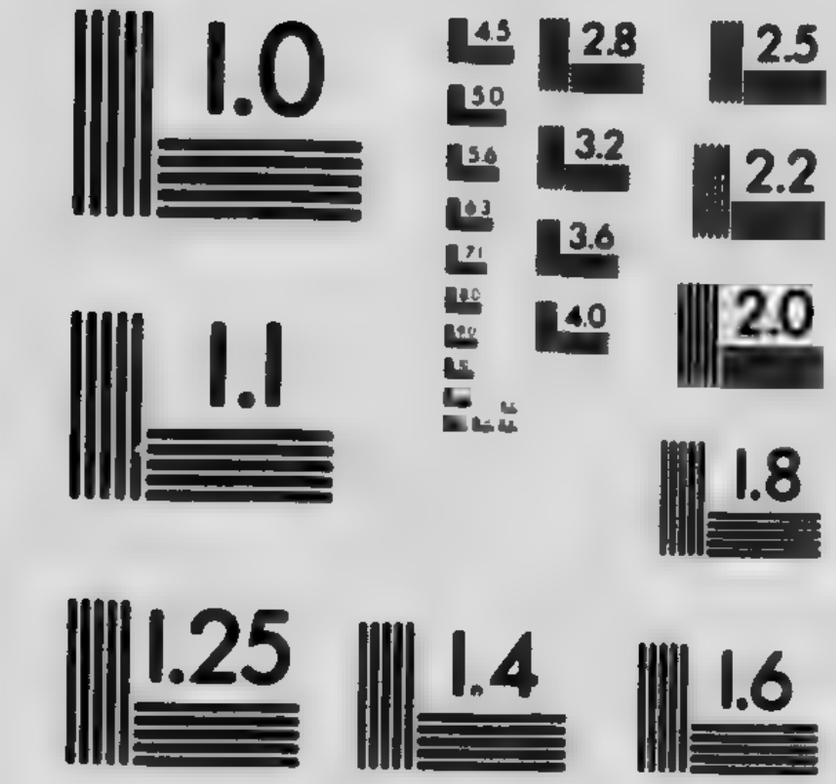

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these diseases, and their effects on the child, is responsible for the spread of the disease, and also for the unwillingness of the patient to submit to prolonged treatment. The Royal Commission therefore recommend that cards of instruction should be issued to patients in some such form as these:

SYPHILIS.

1. Syphilis is a contagious disease; it can be cured if promptly treated by a doctor.

2. Treatment by quacks, herbalists, or persons advertising so-called Nature cures, is likely to lead to disastrous results.

3. The infection may last several years. It can be conveyed to others by sexual intercourse, by kissing, or by using the same eating or drinking utensils, etc.

4. Treatment should not be stopped until the doctor says this may safely be done.

5. Should signs or symptoms of the disease appear, such as rashes on the skin, sore throat, or symptoms of nervous disease, a doctor should at once be consulted.

6. A doctor should be consulted occasionally, even though there are no signs of a return of the disease.

7. Treatment need not, as a rule, interfere with work or necessitate a stay in hospital.

8. No one who has, or has had, syphilis should marry without permission of the doctor; otherwise there is grave danger of giving the disease to wife (husband) and children.

9. Teeth should be cleaned night and morning. The patient should dress warmly, live simply, and avoid wine, beer, spirits, and other intoxicants.

GONORRHŒA.

1. Gonorrhœa is a contagious disease contracted through sexual intercourse Gonorrhœa may be attended by grave consequences, especially if treatment is neglected and the necessary precautions not taken.

2. Treatment by quacks, herbalists, or advertisers, is likely to lead to disastrous results.

3. Sexual intercourse must on no account be indulged in while there is any discharge, even though this may be only slight. If this rule is neglected, the condition is made worse. Moreover, there is always danger of communicating the disease.

4. Gleet, a late form of gonorrhœa, associated with a slight chronic discharge, is very likely to communicate the disease to the wife (husband), causing much suffering and sometimes leading to chronic invalidism and barrenness.

5. Care must be taken that the discharge is not conveyed to the eyes. Neglect on this point may lead to injury to eyesight or to blindness.

6. Large quantities of simple fluids should be drunk, but no wine, beer, spirits, or other intoxicants, should be taken while the discharge continues, and for some considerable time after it has stopped.

Even if it is not considered expedient actually to issue instruction cards similar to the above, it is always advisable to give such advice verbally to the patient, and it is the duty of the doctor to do so.

The position of the medical adviser when a patient with venereal disease is about to marry is one of difficulty. There is at present no legislation to prevent the marriage of a patient with active venereal disease, and the Commission consider that "it would not be possible at present to organize a satisfactory method of certification of fitness for marriage" in such cases. A difficulty may also arise about making statements to parents or others regarding the existence of venereal disease, especially in a patient about to marry. "To assert to a third person that anyone is suffering from venereal disease is, if in writing, a libel, or, if by word of mouth, a slander . . . but, in a civil action against a medical practitioner, proof of the truth of the defamatory words affords a complete defence; and in criminal proceedings, if the jury should find the defamatory words were true in substance and in fact, and also that it was for the public benefit that the matters charged should be published, the defendant would be entitled under Lord Campbell's Act to judgment in his favour." But even if an action against a medical man should fail, and supposing he is fortunate enough to be granted costs, it would be but a poor return to the doctor for the loss of time and trouble caused by his successful defence. Moreover, in cases in which the patient is partly cured, it would be difficult and dangerous for the doctor to take on himself the burden of justifying the alleged libel. The Commission therefore state that "we think a change in the law in this respect is much needed. We therefore recommend that such communication, when made *bona fide* to the parent, guardian, or other person directly interested in the welfare of the woman or the man, and with the object of preventing or delaying a marriage with a person who is in an infectious state, should be deemed to be a privileged communication."

As the law now stands, it is *not* a privileged communication. Venereal disease is also of medico-legal importance because of its presence being, in the future, a possible ground for obtaining a declaration of nullity of marriage. The Royal Commission on Divorce recommended it, and the more recent Commission states: "We think it most important that it should be laid down by law that the presence of venereal disease in an infectious state constitutes an incapacity for marriage, whether or not the presence of disease is known." Regarding venereal disease and divorce, it may be assumed that by the communication of disease by husband to wife,

when the law requires that adultery should be proved as well as cruelty, in order to obtain a divorce, "a venereal disease acquired after marriage is, practically, a ground for divorce, being almost always a proof of adultery."

SOFT CHANCRE (CHANCROID OR SOFT SORE).

This disease is characterized by the formation of multiple pustules, which soon burst, forming small ulcers on the vulva and vagina. The former situation is by far the more common. It is caused by infection with the bacillus described by Ducrey, and is always conveyed sexually. The ulcers are multiple and generally painful. They are circular in outline and sharply punched out in appearance. Their bases are covered by a yellow-grey slough, and around each is an area of hyperæmic skin or mucous membrane.

The disease is very contagious, and the sores are inoculable on other portions of the patient's body—for instance, on the thigh: this latter characteristic is useful as a means of diagnosis in obscure cases. The pustule forms within one to three days after infection, and soon bursts, to form the characteristic sharply defined ulcer. The glands in the groin become enlarged, and are tender and soft, thus differing from the adenitis associated with primary syphilitic affections, in which the glands are discrete, hard, and painless. Secondary infection of the soft chancres with pyogenic organisms being usual, it is not surprising that these glands very frequently suppurate and form a bubo in the groin which heals but slowly after incision. Soft chancres tend to spontaneous cure if kept surgically clean, but if secondary pyogenic infection occurs, and the case is not efficiently treated, there may be considerable destruction of tissue and consequent scarring. They cause no constitutional disturbance, and no subsequent ill effects on the patient or her children.

The disease has to be differentiated in the early stage from simple furuncles caused by pus infection of the hair follicles. These furuncles have the ordinary appearances that boils elsewhere usually have, and there is a hair in the centre of each. From primary syphilis it is diagnosed by the shorter incubation period, the multiplicity of the lesions, the absence of induration, their auto-inoculability on the patient's thigh, and the presence of glands which are soft, painful, and tend to suppurate. Finally, and most important of all, the spirochætes can be demonstrated in syphilitic lesions. Ducrey's bacillus is found only with difficulty, and therefore cannot be depended on for diagnostic purposes. Syphilis and soft sores

often are present in the same patient at the same time. Pus infection of abrasions may simulate soft chancres, but the absence of the punched-out ulcer and the typical adenitis should prevent mistakes. Tuberculous ulceration of the vulva is always chronic in its course, whereas soft sores rapidly heal. Herpes may affect the vulva; in this case the pustules are preceded by pain, punched-out ulcers do not occur, and the typical glandular enlargement is not present.

The treatment consists in making the patient use antiseptic lotions frequently, and applying a dusting-powder (such as iodoform and boracic acid in equal parts) in order to keep the ulcers dry. Rest in bed should be advised. If the glands suppurate, the abscess should be opened.

SYPHILIS.

This disease is due to infection by the *Spirochæta pallida*. An abrasion of the skin is an important predisposing cause, as it allows the organisms to reach the subcutaneous tissues in which they multiply. After an incubation period of three or six weeks from the time of infection, the multiplication of the spirochætes gives rise to an inflammatory mass, which usually ulcerates, and is termed a hard chancre. This is typical of the first stage of syphilis, and is therefore called the primary lesion.

The site of the hard chancre, in order of frequency, according to Fournier, is labia majora, nymphæ, fourchette, cervix, clitoris, and vagina

The chancre may take the form of a raised livid papule or granuloma, which is generally indurated at the base, so that it feels like gristle if picked up between the finger and thumb. More commonly the patient is not seen till the initial granuloma has broken down to form a funnel-shaped ulcer. This ulcer has thickened, well-defined edges which slope down to a smooth shiny floor that exudes a thin discharge which tends to dry and form a pellicle like varnish. In cases secondarily infected by septic organisms, the discharge is more free and purulent. The sore is at the level of, or raised above, the skin, and only very rarely more than one is present. When on the labium the whole labium becomes œdematous and doughy. About a week after the appearance of the chancre the nearest lymphatic glands enlarge; they become hard, but remain painless and freely movable. They do not suppurate unless secondary septic infection ensues. The primary lesion is rarely painful, and, especially when occurring on the vulva, it may be ephemeral and rapidly undergo spontaneous healing; in spite of this the spiro-

chætes invade other tissues of the body, and cause further symptoms which will be referred to later.

The usual position in which a chancre is seen is the vulva, but on the whole it is rare to see a primary lesion at all. Probably

FIG. 96.—PRIMARY SYPHILITIC LESION IN THE FORM OF A CHANCRE WHICH HAS ULCERATED.

There is marked œdema of the labium majus on the affected side.

owing to the absence of abrasions, it is very rare indeed to find a chancre on the cervix or vagina (Fig. 96).

To demonstrate spirochætes, a microscopic slide should be pressed against the sore and the exudate be spread on the slide and examined on a black stage. The exudate may be increased in quantity by applying a hot cloth to the chancre. Under an oil-immersion lens the spirochætes appear as white bodies on the

black ground. The sore must not be scraped or made to bleed when making the film. A fortnight after the first appearance of the chancre a positive serum reaction is obtainable. Although the demonstration of spirochætes proves the syphilitic nature of a lesion, their absence on one occasion does not prove that syphilis is not present, as several examinations may be necessary before they can be detected (Fig. 97).

The chancre differs from a carcinoma in the lesser degree of friability and lesser tendency to bleed on examination, the funnel shape of the ulcer (as opposed to the rolled-over, everted edge of a

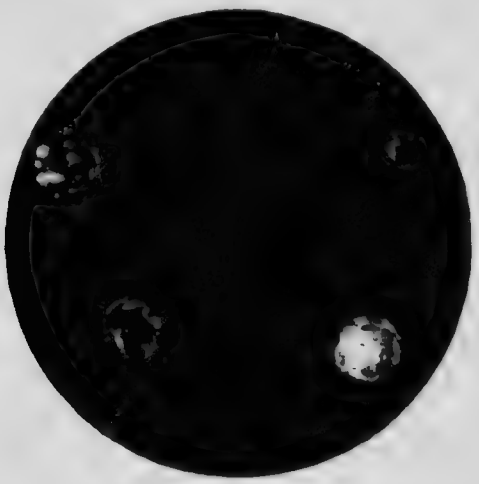


Fig. 97.—The Spirochæta Pallida with Cells and Cell Debris, as seen by Dark-Ground Illumination.

carcinomatous ulcer), the early implication of glands, the onset of secondary manifestations, the presence of spirochætes, and a positive serum reaction.

About the seventh week after the appearance of the chancre, the first noticeable evidence of dissemination of the spirochætes occurs in the form of a skin rash. The rash is multiform, the spots are of a brownish-red colour (often aptly compared to that of raw ham) and most marked on the chest and forearms. Simultaneously the organism may be disseminated in the mucous membranes, especially the throat, causing sore throat. Mucous tubercles may often be found, especially on the tonsils. These appear as pearl-white patches, and are often kidney-shaped. The toxins escape into the blood, and produce anæmia, debility, headache, bone pains, and falling out of the hair, often accompanied by a little fever.

A slight generalized, soft enlargement of all the lymphatic glands

may be present at this stage. Those in the posterior triangles of the neck and just above the elbow are sometimes especially noticeable. Another striking manifestation of syphilis which occurs soon after the appearance of the rash is the formation of mucous tubercles (condylomata lata). These consist of flat-topped papillomata which occur especially round the vulva and anus. Owing to their situation, they rapidly tend to become infected, and so usually appear as raised discs with a slightly dented-in top, which is covered by a greyish adherent exudate which has an offensive smell. These mucous tubercles may be mistaken for gonorrhœal warts (with which they may coexist). They are, however, flatter, more umbilicated, more ulcerated, are associated with other manifestations of syphilis, and do not tend to spread out on to the buttocks and thighs as gonorrhœal papillomata do. They are most marked in cases in which local cleanliness is not properly attended to. A serum reaction may be diagnostic in a doubtful case.

In the later stages of the disease—perhaps years after the hard chancre has healed—lesions occur which most commonly are seen as ulcers or lumps associated with fibrous overgrowth. These manifestations of syphilis are called gummata, and may affect any and every portion of the body. They are, however, but infrequently seen on the genital organs. They are characterized by large irregular ulcers with undermined edges, a serpiginous outline, and a base like wet wash-leather. There are usually several present. Such cases somewhat resemble tuberculosis of the vulva (a rare disease, and almost always associated with advanced phthisis) and an epitheliomatous ulcer. The latter has a rolled-over, everted edge, and only one ulcer is present. Gummata of the vulva are so uncommon that, in actual practice, the diagnosis would be made by the presence of typical gummata elsewhere in the body and by a positive serum reaction, or by submitting a portion excised from the gumma to microscopic examination.

In neglected cases of syphilis, fibrosis of viscera such as the liver is known to occur as the result of chronic inflammation produced by the spirochætes, and it is possible that the ovary and uterus may be thus affected in rare instances. Thus, cases of atrophic sclerosis of the ovary and chronic metritis (fibrosis uteri) have been ascribed to late syphilitic changes.

It must be remembered that women with syphilis may come for treatment because of the effect of the disease on child-bearing. In such cases, although the serum reaction may be strongly positive, it may be impossible to obtain a history of any local lesion. This is not necessarily because of any wilful deception on the part of the

patient, but because the primary lesion may have been ephemeral and unobtrusive, and the later manifestations may have been slight and ascribed to other causes. If the patient becomes pregnant soon after acquiring syphilis, she will probably have an abortion in the early months of the pregnancy. According to the virulence of the infection and the treatment given, subsequent pregnancies may be carried to nearly full time, and then a macerated fœtus expelled. Later on a child may be born at full time, but is puny and does not long survive. Finally an apparently healthy child is born, which may later develop the signs of congenital syphilis, or even, in some cases, may remain apparently healthy and do well.

It is unusual to be able to prove that abortions within the first three months of pregnancy are due to syphilis. The history usually obtained is one of miscarriages from the fourth month onward, and then, as the infection wears itself out, gradually a more and more mature macerated fœtus is born, till finally a living child is perhaps obtained. Positive proof of syphilis may be obtained in macerated fœtuses.

In such cases the serum reaction should be tested at once, and, if a positive reaction is present, full and prolonged antisyphilitic treatment instituted as soon as possible for both husband and wife. No time should be wasted in waiting to see how long the next pregnancy continues before starting treatment. Should the patient be pregnant when first seen, the indication for treatment is most urgent, as any delay may mean hopeless infection of the fœtus *in utero*.

Prognosis.

"The cure of syphilis depends on the destruction of the specific organisms and their co[illegible] eradication from the body. The only certain proof of eradi[illegible] reinfection. Since the introduction of modern methods [illegible]sis and treatment, many cases of reinfection have been [illegible] Syphilis may therefore be regarded as a curable disease."

Early diagnosis is essential both for successful treatment and to prevent the spread of the disease. The importance of the demonstration of the organism in the local lesions, and of testing the serum reaction as a means of early diagnosis, must be insisted on. To eradicate the organism, and so render the prognosis good, it is essential that the patient should be treated thoroughly. It is sometimes difficult to make an ignorant patient realize the importance of continuing treatment after all local manifestations of the disease have disappeared, and yet this is essential if a good prognosis is to be assured.

Treatment.

This should be commenced the moment that a diagnosis is made. "The most valuable remedy in the treatment of syphilis is . . . salvarsan or its substitutes." Several substitutes equal to the German preparations are now manufactured in England and France. In addition to the intravenous administration of the arsenic compounds just referred to, mercury should be given. This is best administered by giving the patient repeated intramuscular injections of an insoluble mercurial preparation, such as grey oil. A routine treatment that has been used with success is an injection of salvarsan followed by five weekly injections of mercury. This is repeated, and then a third and final injection of salvarsan given. The serum reaction is then taken at intervals of three months, and if negative till the end of two years the patient is presumed to be cured. If the serum reaction becomes positive at any time, another entire course of treatment must be given.

If fibrosis is present, as seen in late manifestations such as gummata, the iodides are valuable in assisting the absorption of the fibrous tissue.

All ulcers should be kept rigidly aseptic by sponging them frequently with antiseptic lotions, such as perchloride of mercury (1 in 2,000) or eusol. They should be then dried and dusted with a powder consisting of equal parts of calomel and starch.

GONORRHŒA.

This disease is due to the infection of the genital tract with the gonococcus.

This organism is a diplococcus, each half being kidney-shaped, and having the flat surface of one separated from the flat surface of the other by a clear space. The cocci are in groups, and not in chains, and are frequently found inside the protoplasm of leucocytes (see Fig. 92). They are decolorized by Gram's solution, but stain with methylene blue or fuchsin. The usual method of staining is by Gram's method with dilute fuchsin or neutral red as a counter-stain. The gonococcus is cultivated with difficulty, and only on culture media containing a proportion of body fluid—*e.g.*, blood-agar. The culture-tube must be inoculated soon after the pus is removed from the body, and put in the incubator as soon as possible. The growth appears as semi-translucent discs in from twenty-four to thirty-six hours. The gonococcus closely resembles the meningococcus; but the latter grows well on ordinary media, and ferments maltose, whereas the gonococcus does not.

Cause.

The usual method of infection is during sexual intercourse, the usual site of infection being the cervix or urinary meatus. It is most important to recognize that a man who has no acute symptoms, and in whose urethral discharge gonococci may be so few that they cannot be found under the microscope at a single examination, may still be capable of transmitting an infection which may set up the most acute inflammation in the female. This is especially so in the case of virgins and women after delivery, where the tissues seem to be less capable of resisting infection than usual. Thus, a man and woman may cause several acute attacks by reinfecting each other after one acute attack has subsided, and without themselves having been reinfected from an outside source in the interval. In a similar way, acute gonorrhœal ophthalmia may be set up by an infection from a chronic vaginal discharge.

The proof that any pelvic inflammation is actually gonorrhœal in origin depends on finding the gonococcus in the discharge, as there is little doubt that ordinary septic organisms and saprophytes may cause a condition which clinically closely resembles gonorrhœa.

In chronic cases it is often very difficult to demonstrate the gonococcus in the discharge.

Although the usual method of infection is during intercourse, cases are occasionally seen in which the disease is directly transmitted from one woman to another by the use of unsterilized appliances, such as vaginal irrigators, or unsterilized specula. In children's hospitals, outbreaks clinically like those of gonorrhœa have been supposed to have been caused by the infection having been carried from one child to another by the use of the rectal thermometer or towels.

Pathology.

The gonococcus has the power of penetrating the cells of the infected part. Squamous epithelium, especially if thickened, is resistant, but glandular epithelium is easily penetrated. The deeper layers of the connective tissue are rarely affected, but the infection spreads easily along a mucous membrane; thus, following an infection of the vagina, it ascends to the cervix, endometrium, and tubes. How quickly the infection will spread up to the uterus, if it does so at all, depends on the virulence of the organisms and on whether the os is open or closed. The disease has no exact incubation period, but the symptoms are usually noticed within three days of infection.

Symptoms.

The complaint made by the patient will depend to some extent on the particular lesion that is most marked. Usually leucorrhœa, dysuria, and bearing-down pains, are the most prominent symptoms. There may be such swelling and soreness of the vulva that the patient can neither walk nor sit without great discomfort. At the beginning of an acute attack there may be considerable pain over the lower abdomen, with some rigidity and distension, so that peritonitis may be suspected, although on examination no signs of salpingitis or pelvic abscess may be found. Occasionally the general health suffers severely, so that a condition that has been termed "gonorrhœal cachexia" is reached. This is usually the result of a widespread infection of the whole pelvis, attended by anæmia from toxic absorption, constant pain, discharge, menorrhagia, and metrorrhagia, the latter probably indicating uterine infection.

Distribution and Signs.

Vulva.—Especially in children and virgins, the disease may be limited to the vulva for some time. It causes redness, soreness, œdema, and a yellow discharge which irritates the surrounding skin. As a rule, the disease soon spreads upwards to the surrounding parts (Plate III.).

Glands of Bartholin.—The gonococcus very commonly infects the duct of Bartholin's gland. Owing to the inflammatory œdema produced, the orifice of the duct becomes blocked, and so discharge collects above it. Thus an acutely tender fluctuating swelling is produced in the posterior part of the labium majus, and on inspection the opening of the duct can be seen as a bright red spot, often with a bead of pus in the centre.

The Urethra.—The urethra becomes infected in some cases. The patient notices a scalding pain during the passage of urine. The whole urethra is thickened with œdema, so that it can be palpated like a cord running along the anterior vaginal wall. The mucosa is also swollen, and may be everted through the external urethral orifice. On squeezing the urethra from above down, with the finger in the vagina, pus will be expelled. This pus forms a useful material for getting a film for bacteriological examination, as saprophytic organisms are less likely to be present than in pus from the vagina.

Bladder.—The bladder may be infected from the urethritis, and in rare instances the infection may ascend to the kidney, setting up pyelonephritis. The cystitis has the usual symptoms, but it

should be remembered that the urine remains acid, as ammoniacal decomposition does not occur unless there is a mixed infection.

Vagina.—The vagina is frequently only the channel by which discharge from the cervix reaches the exterior. Owing to its squamous epithelium, it is, like the vulva, resistant, and is less affected than the parts round. In the case of virgins and pregnant patients, in whom the squamous epithelium is less resistant than in a multipara, the usual signs of inflammation may be well marked, with œdema and discharge, but otherwise, except in the most acute stages, the vagina is itself comparatively little affected.

Cervix.—The cervix is the most important seat of infection in gonorrhœa, and, owing to the depth and complexity of the glands in the cervical canal, it is very difficult to get rid of infection once it has been established. In fact, the urethra and the cervix may be regarded as the storehouses whence come the organisms which may keep a patient infectious for years. The external os will be found to be deep red, and perhaps the mucosa of the canal will be seen to be everted through the external os. Yellow muco-pus will be found issuing from the canal. This virulent cervical discharge, by its spermatolytic action, may cause sterility without any infection of the Fallopian tubes (Plate IV.).

Uterus.—The uterus may be affected (see Endometritis), and so may the tubes (see Salpingitis and Pelvic peritonitis).

General peritonitis from infection through the patent Fallopian tube is very rare.

As in the male, the dangers of gonorrhœa are not limited to the genito-urinary tract. Arthritis is a frequent complication, and affections of the tendons, ligaments, and bursæ also occur. General gonorrhœal septicæmia, fortunately, is a rare sequel: when it does occur, it often sets up a severe and fatal form of malignant endocarditis. The rectum, in spite of its proximity, is hardly ever affected, but in rare instances a careless patient may infect her eyes or nose. Warts occur as the result of long-continued irritation produced by the discharge in chronic cases. They consist of sessile papillomata which are found on the labia majora and perineum, and occasionally extend out on to the buttock. As a result of trauma and infection, their surfaces may become ulcerated, in which case they somewhat resemble mucous tubercles. Warts may occur from other infections without gonorrhœa being present (Fig. 98).

The inguinal glands are not affected unless abrasions of the skin of the vulva are present, and when they are affected a secondary infection is usually present. The inflamed glands adhere together, and form an abscess which is usually termed a "bubo."

It will be seen that in the female gonorrhœa attacks the reproductive tract chiefly, whilst in the male the urinary tract is the principal seat of infection.

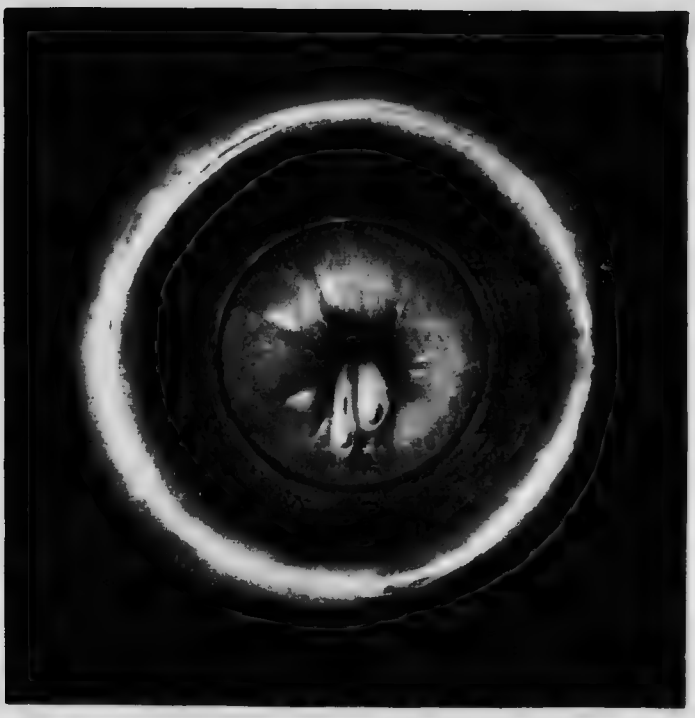
Diagnosis.

To make an absolute diagnosis the gonococci must be demonstrated in the discharge, but a probable diagnosis may be made from the history and the physical signs. If a previously healthy

Fig. 98.—Gonorrhœal Warts: Vulva.

The labia are chiefly affected, but the warts may spread out towards the thighs and buttocks. The anal region is usually free.

woman, who has not recently had either a labour or a miscarriage, suddenly notices an irritating vaginal discharge, attended with dysuria and swelling of the vulva, it is very likely of gonorrhœal origin, and a local examination should be made. If the openings of the ducts of Bartholin's glands are red and inflamed, the urethra



œdematous and oozing pus, and if the cervix is the seat of acute purulent inflammation, a fairly certain diagnosis of gonorrhœa can be made.

Prognosis.

Except in the rare cases of rapid upward spread to the peritoneum, and the cases in which malignant endocarditis supervenes, gonorrhœa is not fatal. It is, however, in women one of the most maiming of affections, owing to its action in producing salpingitis and all its sequelæ (*q.v.*).

It is also one of the most important causes of sterility. Although the acute symptoms soon subside, the infection remains in the recesses of the genital tract for years, and may cause repeated exacerbations of the disease in the patient herself and in the male. It must therefore be regarded as a disease of which the serious results can hardly be over-estimated.

Treatment.

The disease is preventable and the prophylaxis theoretically simple.

As the organisms penetrate the epithelium rapidly, and nothing less than removing the whole of the superficial lining of the affected parts would eradicate the disease, the moist surfaces of the vulva, vagina and cervix may be painted with liquid carbolic acid under an anæsthetic. Otherwise in the acute stage it is usual merely to alleviate the pain and discharge during the first week by putting the patient to bed, keeping her on a slop diet, and giving hot hip baths and hot lotion and fomentations to the vulva. If the vulva only is affected, no vaginal douches should be used, for fear of carrying the infection upwards; but if vaginitis and cervicitis are already present, the discharge should be douched away with some such mildly astringent application as liquor plumbi subacetatis fortis (1 drachm to a pint of water), or alum, or boric acid. A weak solution of one of the proprietary preparations designed to replace the expensive silver salts may be used if the patient can afford them. Urinary antiseptics such as potassium citrate, followed by hexamine, have been tried, with a view to preventing or lessening the infection of the urethra and bladder. As soon as the tenderness has subsided sufficiently to allow of the passage of a metal speculum, the cervix should be swabbed with an alkaline solution (*e.g.*, liquor potassæ and water in equal parts) to remove the mucus, and then the cervix and the vagina painted with 10 per cent. solution of proteinate of silver, which, as it does not coagulate albumin, pene-

trates the tissues more deeply than silver nitrate. Some authorities prefer to use a freshly prepared 5 per cent. solution of silver nitrate. Especial care should be taken to reach the glands of the cervical canal and those round the urethral opening. This painting should be repeated two or three times weekly. As the organisms are in the cells below the surface, little good will result from douching; but it is as well to wash the discharge out of the vagina, and by using astringent solutions some of the superficial cells containing gonococci may be cast off and washed away. A very large number of drugs have been used for this purpose: zinc sulphate and tannic acid (30 grains of each to the pint) or copper sulphate (20 grains to the pint) are among the most useful.

If the skin round the vulva becomes very sore, a thick application, such as unguentum zinci, should be applied to protect it from discharge. No operative treatment, such as curettage, should be thought of during the acute or subacute stages, although sometimes an acute Bartholin abscess may require opening. In a chronic case, if the cervicitis persists in spite of painting, it should be scraped with a sharp spoon, or even the whole cervix amputated (see p. 577).

Vaccine treatment may be tried in cases which resist other methods. The best results are obtained with an autogenous vaccine, the initial dose being about 5,000,000. There are, however, technical difficulties in preparing an autogenous vaccine by any except expert bacteriologists.

CHAPTER XXXIV

TUBERCULOSIS OF THE GENITAL TRACT

Tuberculosis of the Fallopian Tubes.—The part of the genital tract most vulnerable to tubercle is the tube, for whereas tuberculosis of the rest of the tract is very rare, salpingitis set up by the tubercle bacillus is seen comparatively frequent. When the internal genital organs are attacked secondarily to a tuberculous peritonitis occurring in the upper abdominal cavity, the Fallopian tubes are always affected first. Theoretically, infection of the tube may occur in one of three ways—from the blood-stream, by direct extension from the peritoneum above, or as an ascending infection from below. Although it is difficult in any case with certainty to exclude a blood-infection, it is probable that the second of the three is the most common method of infection.

Pathology.

The tube is enlarged and tortuous, its walls are thickened, and on its peritoneal surfaces miliary tubercles can be seen. The tube is often distended, forming a pyosalpinx, and in its wall caseous masses may be found. The tubes are densely adherent to the surrounding parts, especially to the ovaries, so that ovarian infection frequently coexists. On microscopic examination, the usual features of visceral tuberculosis, including giant-cell systems, are to be seen both under the peritoneum and in the mucosa. Although tuberculous salpingitis is often associated with disease elsewhere, this is by no means invariable, and in a considerable proportion no other tuberculous lesion can be demonstrated.

The organism tends to die out in chronic cases, and is difficult to demonstrate. Secondary infection of the tube from the bowel may occur.

Symptoms.

These do not differ appreciably from those of salpingitis caused by other organisms. Pain is usual: it occurs both as a constant ache and as a dysmenorrhœa. Leucorrhœa is often marked.

Menorrhagia may not be present because of the generally poor and anæmic condition of the patient. Occasionally the onset of symptoms is subacute; this is probably due to a secondary infection with the bacillus coli.

Diagnosis.

This cannot be made with certainty; but if a mass can be felt in the posterior quarter of the pelvis in a patient who is known to have phthisis, or in whom there are signs of tuberculous peritonitis, a correct diagnosis of tuberculous salpingitis is very probable. The existence of definite signs of salpingitis in a virgin or in a patient in whom gonorrhœa and puerperal sepsis can be excluded is highly suggestive of either tubercle or infection from the bowel.

It should be noted that a case of tuberculous peritonitis with ascites, especially when the matted appendages form a fixed mass in the pouch of Douglas, bears a superficial resemblance to a case of malignant disease of the ovary complicated by malignant peritonitis and free fluid.

Prognosis.

This will depend chiefly on the extent to which the general peritoneal cavity is affected and on the coexistence of phthisis. The cases with ascites often improve in a marvellous way after operation.

Treatment.

It is well known that the cases with ascites derive much benefit from a simple laparotomy performed in order to evacuate the fluid, although the exact way in which the laparotomy causes the improvement is not understood. Hence in these cases abdominal section is always indicated, but in addition to this, in patients with salpingitis, there is a more or less localized focus of tuberculosis which can be removed by surgical procedures; and so, following the ordinary rules of surgery, it should be removed if not too intimately adherent to the intestine. In cases in which there is in addition extensive disease of the lungs or of the general peritoneum, the improvement that can ensue from removing the one focus in the tube must be but slight, and so such cases must be treated according to their special circumstances.

As the uterus is frequently affected as well as the Fallopian tubes, it should be removed; and, as the disease is usually bilateral, both appendages will have to be sacrificed. If for any reason it is decided not to remove the uterus, the uterine ends of the tubes must be cut off very close to the uterus, and the stumps covered

in to prevent peritoneal infection from the mucous membrane contained in the stump; and two or three ounces of ether may be poured into the pelvis to aid in the prevention of infection. Adhesions to the bowel require very careful handling, as the risk of fistula formation is considerable. The abdominal incision should not be sewn up with sutures passing through the whole thickness of the abdominal wall, as there have been cases in which the tubercle has tracked along the suture from the peritoneum to the skin.

Tuberculosis of the Uterus.—Tuberculosis may infect the body of the uterus or the cervix. When the body of the uterus is affected, it is usually as a tuberculous endometritis. The latter is, as a rule, secondary to salpingitis. Tuberculous endometritis has no characteristic symptoms, and is usually diagnosed by finding the giant-cell systems in the curettings. More rarely the caseous matter may fill the cavity of the uterus, and thus be a rare cause of pyometra.

The **cervix** is affected more rarely, but, as cervical tuberculosis clinically resembles cancer, it is of importance. The type most frequently seen takes the form of an ulcer of the portio vaginalis. A purulent discharge, which may become blood-stained, is present. On examination, the ulcer will not be as friable as a carcinoma; but this by itself will not be sufficiently characteristic, and in practice the actual diagnosis should be made by following the rule of submitting a portion of every ulcer of the cervix to microscopic examination.

Tuberculosis of the Vulva and Vagina.—This is very rare, but has been described in patients, especially children, who have advanced tuberculosis elsewhere. It occurs when the infected discharges from a tuberculous bladder or uterus flow over the vulva. The lesion takes the form of chronic ulcers and fistulæ, which may be accompanied by fibrous overgrowth of the affected part. In vaginal tuberculosis, the posterior wall is the part most frequently affected.

Treatment.

If the disease is primary, or if the other lesions are not too advanced, an attempt should be made to excise the diseased tissue as freely as possible; but in the majority of cases this is not practicable, and all that can be done is to apply caustics and keep the parts as aseptic as possible.

Tuberculosis of the **Bladder** occurs, causing a cystitis with the usual symptoms, except that in the early stages the urine remains acid as it does in bacillus coli cystitis.

SECTION VII. — LESIONS OF THE VULVA, VAGINA, UTERUS, OVARY, AND FALLOPIAN TUBE

CHAPTER XXXV

LESIONS OF THE VULVA

SWELLINGS and growths of the vulva may be conveniently studied under the following headings:

Cyst of the Vulva.

Developmental cyst.
Cyst of Bartholin's gland or duct.
Sebaceous cyst.
Implantation cyst.
Hydrocele of the canal of Nuck.
Urethral cyst.

Infective Lesion of the Vulva.

Chancre, condyloma.
Soft sore.
Caruncle.
Furunculosis.
Inflammation of Bartholin's gland.
Gonorrhœal warts.
Tuberculosis, lupus.
Elephantiasis.
Actinomycosis.
Noma vulvæ.
Esthiomène.

Innocent Tumour of the Vulva.

Lipoma.
Fibroma.
Papilloma.
Adenoma.

Malignant Tumour of the Vulva.

Carcinoma.
Sarcoma.
Melanoma.
Chorion-epithelioma.
Rodent ulcer.

Other Lesions.

Hæmatoma vulvæ.
Varicose veins.
Leucoplakia vulvæ.
Kraurosis vulvæ.

CYST OF THE VULVA.

Developmental Cysts may arise from remains of the Wolffian body. These cysts are usually situated in the labia minora, and are lined by columnar epithelium.

The commoner cysts of the vulva arise from the structures in the neighbourhood.

Cyst of Bartholin's Gland or Duct. These cysts usually arise in the duct, and are caused by a blocking of the duct. They appear as rounded swellings on the inner surface of the posterior part of the labia majora. Sometimes the occlusion of the duct is not complete, and the cyst on becoming tense may discharge itself, with relief of the symptoms. The discharge is of a mucoid nature. A Bartholin's cyst is, as a rule, unilateral, unless it is due to an acute infection of the vulva. If the cyst is a chronic condition, the gland itself may be involved.

SYMPTOMS.

The patient usually complains of discomfort on walking or sitting, but the pain may be more constant owing to the tension, and in addition, if the cyst should suppurate, there will be pain and tenderness. There may also be dyspareunia.

SIGNS.

The cyst presents a characteristic swelling at the posterior end of the labium majus, about the size of a pigeon's egg. The labium minus is stretched over it, and the orifice of the duct may be seen to be bulging into the vulva (Fig. 99).

Diagnosis.

A differential diagnosis must be made between this condition and hæmatoma vulvæ, labial hernia, hydrocele of the canal of Nuck, lipoma, fibroma, or sebaceous cyst of vulva. A hæmatoma is a more diffuse swelling, more doughy in consistence, usually discoloured, and there is a recent history of trauma or parturition.

Fig. 90.—Cyst of Bartholin's Gland.

A hernia extends up to the external abdominal ring, tends to disappear on lying down, has an impulse on coughing, and is resonant on percussion if it consists of intestine.

A hydrocele of the canal of Nuck occupies the upper and middle part of the labium majus, the lower end being free.

A lipoma, fibroma, or sebaceous cyst of the vulva is a more superficial swelling, and should not give rise to difficulty in diagnosis.

Treatment consists of excision of the swelling.

Sebaceous Cysts are due to blocking of a sebaceous follicle, and

have the characteristics of these swellings in other parts of the body. If large or giving rise to symptoms, they must be excised.

Implantation Cysts are due to the inclusion of fragments of epidermis following operations or injury, commonly during labour, to the vulva. They occur usually at the posterior part of the vulva, and, if they give rise to symptoms of discomfort or pain, must be excised.

Hydrocele of the Canal of Nuck. This condition is analogous to an encysted hydrocele of the cord in the male, and is produced by the funicular process of peritoneum which accompanies the round ligament becoming distended with fluid, although shut off from the general peritoneal cavity. It occupies the same position as an inguinal hernia, and, if large, may extend into the labium majus. It is distinguished from a hernia by there being no impulse on coughing and by being irreducible. If the hydrocele is reducible, it is probably a hernial sac. Treatment consists of excision of the cyst.

Urethral Cysts, although usually projecting into the vagina, may grow outwards and present at the vulva. They arise through blocking of the ducts of the glands lying in the floor of the urethra. The glands are the homologue of the prostate in the male. The cysts are situated below the floor of the urethra, and usually project into the vagina. They may be single or multiple, but do not as a rule attain a large size. They give rise to discomfort or pain, and in some cases intermittently discharge their contents into the urethra, producing a muco-purulent discharge. In other cases they produce sacculation of the urethra, and, acting as a reservoir for the urine, cause a false incontinence of urine. They should be dissected out and their junction with the urethra carefully sutured.

INFECTIVE LESIONS OF THE VULVA.

Hard Chancre and Condyloma.—(See pp. 265 to 268.)

Esthiomène, which was formerly called lupus or tuberculosis of the vulva, is now known to be a tertiary syphilitic lesion. It causes great enlargement and hypertrophy of the labia, and is sometimes known as false elephantiasis of the vulva. There are present multiple ulcers with hard raised edges. A positive Wassermann reaction clinches the diagnosis, and the exhibition of iodides, with or without mercury, cures the local condition.

Soft Sores.—(See p. 264.)

Caruncles most often occur in women at or about the climacteric, but may be found at any period of adult life. They spring from the mucous membrane of the posterior wall of the urethra, and are commonly single. They may be sessile or pedunculated, and are usually of the size of a pea, but may attain a much larger size. They are often flattened from side to side with a crenulated upper edge, aptly compared to a cockscomb. Their origin from the mucous membrane is often higher than appears (Plate V.).

These growths are of a bright red colour, and sometimes bleed on contact; they may cause pain on micturition, though not invariably so; pain and hæmorrhage on coitus may be present. In many cases there may be a caruncle without any symptoms suggesting its presence.

Histologically two varieties are met with. The common variety is composed of connective tissue covered more or less completely with stratified epithelium, with a stroma rich in dilated bloodvessels and indistinguishable from a granuloma. This variety is probably infective in origin. Another type is made of denser connective tissue enclosing gland-like crypts. This variety includes those which have been described as fibrous caruncles and glandular caruncles. These are probably partial prolapses of the urethral mucous membrane.

A caruncle, especially a sessile one, must be distinguished from prolapse of the mucous membrane or an early carcinoma of the urethra. The former is more purple in colour and of a firmer consistence, and extends all round the urethra. The latter is localized, harder, and bleeds readily on contact. Occasionally the pouting inflamed mucosa present in an acute infective urethritis may be mistaken for a caruncle.

Treatment consists of excision of the caruncle-bearing area either with knife or cautery. Mere cauterization of the caruncle itself is usually followed by recurrence.

Furunculosis.—The hair follicles in the neighbourhood of the vulva may become infected and give rise to a crop of boils. These should be treated with antiseptics, and incised if necessary. The inguinal glands will become enlarged.

Inflammation of Bartholin's Gland is generally associated with gonorrhœa. It may be a simple adenitis, and it is highly probable that it does not go on to suppuration unless associated with other organisms, such as streptococcus, staphylococcus, or the bacillus coli communis. The organisms gain access to the gland through the duct, which opens just external to the hymen. If the gland and

duct are infected, the mouth of the duct is seen on inspection to be surrounded by a hyperæmic zone, and on pressing the duct a drop of pus will appear. The gland itself, felt with the finger in the vagina and the thumb on the perineo-vulval junction, will be found to be enlarged and tender. If suppuration takes place, with the formation of an abscess, the skin over the gland will become red and œdematous. The abscess usually points at the inner surface of the labium minus. The duct as a result of the infection often becomes blocked, and the pent-up secretion forms a cyst of the duct. The blocking up affects the gland, and a Bartholin's cyst results.

TREATMENT.

The treatment of an abscess is incision, and, if the condition recurs, excision of the gland. A cyst of the duct or of the gland requires removal if it gives rise to symptoms.

Gonorrhœal Warts.—These warts are soft and luxuriant in their growth (see Fig. 98). They occur on the labia and perineum, and often invade the vagina and even the cervix. They cause pain and much discomfort, and give rise to an offensive muco-purulent discharge which leads to septic absorption and pyrexia. Sometimes, especially if associated with pregnancy, the warts tend to hypertrophy, and may attain the size of a man's fist. Histologically they are composed of a central core of branching connective tissue covered by stratified epithelium. Warts are occasionally seen with irritating discharges other than gonorrhœa.

TREATMENT.

The condition is resistant to ordinary treatment, and it appears that radium offers the most satisfactory form of non-operative treatment. The parts should be sponged with an antiseptic lotion, and if there is an irritating vaginal discharge this should be treated with douches. The parts should then be dried thoroughly with cotton-wool, and calomel or a powder composed of boric acid 2 parts, oxide of zinc 4 parts, and starch 6 parts, should be freely dusted over the warts, and the treatment frequently repeated. X-ray treatment can be employed if the patient is not pregnant. Should the patient be pregnant, the warts should be removed by excision or the cautery, as they are a possible source of infection during parturition, although they usually disappear after pregnancy.

Tuberculosis of the Vulva is usually a secondary infection following tuberculosis of the uterus, or as a complication of phthisis. It is very rare. It attacks the labia and causes chronic

ulceration, the lesions appearing as punched-out ulcers with bluish undermined edges. Other lesions may appear as tubercles which have not as yet broken down, and in places there may be cicatrices denoting a healed ulcer.

Treatment consists of excision if limited, or scraping with a sharp spoon, and the application of caustics if the area affected is extensive.

Elephantiasis Arabum is a disease of tropical climates, and is caused by an infection and blockage of the lymphatics by the *Filaria sanguinis hominis* or masses of its ova. It is characterized by enormous enlargement of the labia.

Actinomycosis.—The vulva, like other parts of the body, may be infected with the ray fungus, a streptothrix. The labia ulcerate and suppurate, and form numerous sinuses; and in the thin pus exuding there are seen minute yellow particles, which on microscopic examination are found to be made up of the characteristic mycelium, club-shaped sporing bodies of the ray fungus.

Treatment consists in a free excision of the parts affected, and the administration of iodides internally in massive doses.

Noma Vulvæ is a pyogenic infection of the vulva associated especially with measles, and occurring in underfed and debilitated children. There is an extensive gangrenous infection of the vulva, and a horrible fœtid stench. It is comparable with cancrum oris, and needs energetic antiseptic treatment.

INNOCENT TUMOURS OF THE VULVA.

Lipomata are composed of areolar tissue containing fat in their meshwork, and are found most commonly in the labium majus. They do not give rise to pain, and only cause inconvenience from their position and size.

Treatment.

If these tumours grow to a large size, they can be removed by an incision over the centre of the swelling, enucleation, and suturing the base.

Fibromata are composed of loose fibrous tissue arising in the corium of the skin, and when they have attained a sufficient size they become pedunculated. They usually occur in the neighbourhood of the labium majus. They sometimes grow to a large size, and, from their position and their liability to friction, may slough.

Treatment.

These tumours are removed by an elliptical incision at their base. The pedicle is then ligatured, and the wound sutured.

Papillomata may occur as discrete and scattered warts not differing from warts on other parts of the body. When present in considerable numbers, they are generally due to some chronic irritation of the skin or a low form of infection. When due to this latter cause, they are softer and more luxuriant in their growth.

Treatment.

If they are single or scattered, no treatment is necessary; if, however, they are due to some micro-organism, and show a tendency to spread, it may be necessary to excise the area if the condition is not improved by antiseptic lotions.

Adenomata, apart from a growth of Bartholin's gland, are exceedingly rare. They invariably arise from vestigial remains of tubules in the neighbourhood.

MALIGNANT TUMOURS OF THE VULVA.

Carcinoma of the vulva usually appears as the squamous-celled type of epithelioma. It occurs at the end of sexual life, most commonly between the ages of forty-five and fifty-five. Quite 80 per cent. of the patients are married, and it is slightly more frequent in those who have borne children than in those that are sterile. Leucoplakic vulvitis and pruritus are frequently antecedent to this condition.

Symptoms.

The patient usually complains of great irritation of the vulva and a foul sanious discharge. There may in addition be pain, especially in late cases.

Signs.

The labium majus is the most frequent site; others are the clitoris, urethra, and labium minus. When seen early, carcinoma occurs as a small hard nodule situated on the labium (Plate VI.). If seen later, it is ulcerated, with raised everted edges, and owing to the moisture of the parts the surface soon becomes sodden and permeated with putrefying organisms which give rise to an offensive sanious discharge. The superficial inguinal glands become enlarged, as a result both of sepsis and lymphatic extension of the growth. Fortunately, the spread of the growth is slow, and free excision is

worth while even in cases of long-standing. It is not uncommon for a growth to develop on the opposite labium by contact.

Early excision of the whole vulva, including removal of the glands on both sides, is attended with good results, and the prognosis is fair. If recurrence of the growth takes place, subsequent secondary operations may be undertaken.

Columnar-celled Carcinoma of the vulva occurs as a malignant glandular growth of Bartholin's gland. In the early stages the gland only appears to be large and hard, and differs from an inflammatory enlargement of that gland in that it is usually not tender. In the later stages the growth involves the surrounding tissues, and, fungating through the skin in the neighbourhood, becomes a foul proliferating mass. The glands enlarged are the same as those in epithelioma of the vulva. Microscopically the growth resembles a columnar-celled carcinoma seen elsewhere.

TREATMENT.

Removal of the tumour and the glands draining it.

Sarcoma is a rare disease of the vulva, and arises from the connective tissue, periosteum, or bone in the neighbourhood. It may be round-celled, spindle-celled, or mixed-celled in structure. It sometimes takes on a pigmented form (melanoma), an exceedingly malignant type. This growth occurs on the labium majus in the form of a bluish-black nodule, with or without ulceration on its surface. The glands in the groin are invaded early, and the disease becomes widely disseminated.

TREATMENT.

Early and free removal must be employed, but the growth is most liable to recur.

Chorion-Epithelioma may be present as a purple-coloured nodule of the vulva (see p. 291).

Rodent Ulcer may appear on the vulva. It is a low type of malignant growth arising, probably, from the sebaceous glands, which spreads slowly. The surface of the ulcer is greyish-red in colour, smooth, glazed, and destitute of granulations. It secretes a scanty, thin, watery discharge. The prognosis is good.

TREATMENT.

Complete and free removal.

The diagnosis of growths of the vulva may not at first sight be easy. The difference between sarcoma and carcinoma can sometimes only be diagnosed by the microscope. A hard chancre must be distinguished by its hard base and definite outline, and by the accompanying œdema of the labium. The inguinal glands will be small, separate, and amygdaloid. The exudation from the surface may show the spirochæta pallida. Tuberculosis of the vulva and lupus will present tubercular masses (apple-jelly granulations), irregular ulcers with bluish undermined edges and old cicatrices. Tubercle bacilli may be present on a film made by scraping the surface. Phagedenic ulceration of the vulva appears as a gangrenous abscess cavity with free secretion of pus and no induration.

OTHER LESIONS.

Hæmatoma Vulvæ (see Midwifery).—This condition is nearly always due to traumatism, usually during pregnancy, or to injury during childbirth. A predisposing condition is varicosity of the veins of the vulva. The swelling usually starts in the labium majus, and spreads towards the perineum and the inner side of the thigh. It gives rise to a good deal of pain from distension of the tissues. The swelling is of a purple colour. A hæmatoma of the vulva is diagnosed by its appearance and from its sudden onset following a blow or parturition.

Treatment.

If the swelling is increasing rapidly in size, there is probably a large vessel bleeding, and the best treatment is to incise the swelling, turn out the blood-clot, and secure the bleeding vessel by packing tightly or by underpinning. Usually this is not necessary, and with the application of cold compresses the swelling rapidly subsides. If the hæmatoma suppurates, incision and drainage are necessary.

Varicose Veins of the vulva are usually associated with pregnancy, from the pressure of the enlarged uterus on the pelvic veins. The veins of the rectum are often involved in the process, giving rise to hæmorrhoids. The danger of this condition is rupture during parturition, with the formation of a hæmatoma or phlebitis or thrombosis following the birth. Students often describe varicose ulcers as occurring on the vulva: they are never seen.

Treatment.

If the patient is not far advanced in pregnancy, and the veins are likely to be damaged by childbirth, in severe cases

the patient should be kept in bed, with the end of the bed raised.

Leucoplakia Vulvæ.—Leucoplakia vulvæ is a chronic inflammatory condition of the skin in the neighbourhood of the vulva. It occurs most frequently in the married at the end of sexual life, but the incidence is not affected by parity. The primary site is usually the inner side of one labium and later the whole of the vulva, with the exception of the vaginal orifice and vestibule, may be attacked, and in severe cases it may spread to the perineum and the inner aspects of the thighs. The underlying cause is unknown. The close connection this disease has with carcinoma of the vulva draws attention to the parallel condition of leucoplakia of the tongue and cancer. But whereas syphilis is an almost constant factor in leucoplakia of the tongue, there is no evidence to connect leucoplakia of the vulva with syphilis.

Pathology.

The early stages are characterized by swelling of the corium, and the deeper layers of the skin are very vascular and crowded with lymphocytes. Later there are seen lymph nodes, and there is a disappearance of elastic fibres. In the later stages the inflammatory process ceases, and there is an increased amount of fibrous tissue in the deeper layer of the skin, with consequent thinning of the epidermis and the formation of a flat surface, which gives the appearance of being ironed out, with a dull whitish glaze.

Symptoms.

The outstanding feature of leucoplakia vulvæ is itching, which is very intense and persistent. In the later stage with ulceration there may be acute pain owing to exposure of nerve endings. In the final stage of atrophy there is a cessation of pruritus and pain.

Signs.

The early stage consists in redness and swelling of the labia, the surface being dry and rough. Later the colour changes from red to a parchment-like colour, from which characteristic the disease derives its name. During this stage the surface may become fissured or ulcerated, and a granuloma or an epithelioma may develop. The final stage, if an epithelioma does not occur, consists of an atrophy of the labia and vulva—especially the labia minora, which disappear—with keratinization of the skin and cessation of symptoms.

Treatment.

As the itching is usually more troublesome at night, the patient should be instructed to keep herself as cool as possible by using a minimum of bedclothes. In addition, if the patient can sleep on her back, with a small hair pillow between her knees, the vulva will tend to keep cooler. A small piece of lint moistened with lotion, and placed between the lips of the vulva, is sometimes a great relief. This may require renewing several times in the night.

Application of various ointments and lotions may be tried. The most useful are equal parts of unguentum hydrargyri and unguentum zinci, unguentum plumbi acetatis, or resinol. A lotion of equal parts of liquor carbonis detergens and liquor plumbi subacetatis, a teaspoonful to half a pint of water, or 10 minims of dilute hydrocyanic acid to an ounce of water, can be used as an antipruritic. The application of pure carbolic acid to the surface, or of a 5 per cent. solution of silver nitrate, is sometimes successful. The treatment by X rays has in some cases been attended with good results.

Ionization with copper, zinc, and silver, has been used with success in some patients.

If the foregoing measures do not relieve the patient, the whole of the diseased area must be removed, as, if persistent, it must be regarded as a precancerous condition.

Kraurosis Vulvæ is a rare disease, and is a chronic atrophic condition of the vulva occurring at or after the menopause, natural or artificial. It attacks the inner surface of the vulva and the vestibule, and is often associated with a caruncle of the urethra. In contradistinction to leucoplakia, it does not attack the outer surface of the labia majora, perineum, or the inner surfaces of the thighs. From the foregoing, it would appear probable that the changes in the vulva are due to an absence or deficiency of some internal secretion from the ovary.

Symptoms.

The chief symptoms are soreness, especially on passing water, and dyspareunia. Itching is a very occasional symptom. In the final stage the soreness disappears, but owing to the contraction of the vulva dyspareunia is still present.

Signs.

It attacks the muco-cutaneous margin, and gives rise to patches in which the superficial epithelium is thinned while the deeper layer is hypertrophied. In the latter stages the appearance changes,

and gives place to a dirty yellow and shiny surface. The muco-cutaneous surface of the vulva becomes smooth, the labia minora shrink, and the vulval orifice becomes contracted and hardly admits the finger. Allied to this condition is the senile vascular degeneration of the vulva, in which the areas or patches are bright red in colour in the early stages, and with the atrophy of the later stages tend to become yellow. They are often very sensitive and are common in the neighbourhood of the urinary meatus and thus give rise to a mistaken diagnosis of urethral caruncle.

Treatment.

The application of ointments and soothing lotions is almost useless. An attempt may be made to relieve the condition with ovarian extract. It may be necessary to excise the tender patches, and then by a plastic operation to enlarge the vulval orifice.

CHAPTER XXXVI

TUMOURS AND INJURIES OF THE VAGINA

The vagina may be the seat of malignant disease, fibroids, and cysts.

Malignant Disease.—Carcinoma, sarcoma, and chorion-epithelioma, may be found affecting the vagina. The commonest malignant growth is carcinoma.

CARCINOMA.

Carcinoma of the vagina occurs either as a primary or secondary growth.

As a primary growth it is very rare, and generally occurs in women over fifty years of age. In some reported cases it has become engrafted on the ulceration resulting from a badly fitting pessary, and on that following prolapse of the vaginal walls.

Carcinoma of the vagina secondary to carcinoma of the body or neck of the uterus is common. It may also occur in the vaginal scar after removal of the uterus for carcinoma.

Symptoms.

The patient complains of bleeding, especially after coitus or douching. Later there may be a very offensive watery discharge. Backache is present in the majority of cases, and dyspareunia may be marked.

Signs.

In nearly all cases the growth commences on the posterior vaginal wall, and presents itself as a warty growth, or as an indurated ulcer, which quickly becomes fixed, owing to the subjacent tissue becoming involved. The paravaginal tissue is infiltrated; as the growth extends, it gradually surrounds the vagina, reducing the calibre thereof. In course of time the bladder or rectum is involved, or both, leading to vesico-vaginal and recto-vaginal fistulæ. The iliac glands are the first to enlarge.

Pathology.

On microscopical section the carcinoma is seen to be one of the squamous-celled variety.

Treatment.

If possible, a radical operation should be performed, which will entail the removal of the entire vagina and the uterus and its appendages, if these have not already been removed. This may be carried out by an abdominal or vaginal operation in primary carcinoma—probably the two combined is the best—and by the vaginal route in secondary carcinoma. If the bladder or rectum is involved, only palliative treatment can be employed; for information thereon the student is referred to the section dealing with the palliative treatment of carcinoma of the cervix.

CHORION-EPITHELIOMA.

This form of malignant disease of the vagina is extremely rare. It is usually secondary to a corresponding growth in the uterus, but a few cases have been reported in which the disease was primary in the vaginal wall, and no further trace could be found even on the most careful examination of the uterus after its removal.

Signs.

The signs are very distinctive, a dark red or purple nodule being found, which is likely to be mistaken for a hæmatoma or thrombosed vein. If necrotic they may be black on the surface. The appearance in the vaginal wall of such a nodule shortly after a confinement, or especially after the expulsion of a hydatidiform mole, should excite the greatest suspicion.

Prognosis.

The prognosis of the secondary form is very grave, owing to the fact that there will probably be metastases elsewhere. The prognosis of the primary form is fairly good, and most of the reported cases have recovered. In some cases the nodule has spontaneously disappeared, the growth having been isolated by blood poured out round it.

Treatment.

The growth should be freely excised from the vagina, but there is no need to remove the whole vagina. The interior of the uterus should be carefully explored, and if any evidence of growth is discovered there hysterectomy should be performed.

SARCOMA.

Sarcoma of the vagina, which may be primary or secondary, is a much rarer disease than carcinoma. It occurs as a hard, dark-coloured, indurated growth or as an ulcer. Sarcoma grows very quickly, and soon breaks down.

The symptoms and treatment correspond more or less with those of carcinoma of the vagina, and a correct diagnosis will probably not be made without a microscopical examination of a portion of the growth.

Sarcoma of the vagina may appear at any time. One variety, known as the botryoid sarcoma, is almost peculiar to young children, and resembles in appearance a similar condition of the cervix, the growth taking the shape, more or less, of a bunch of grapes.

FIBROMA.

A vaginal fibroma is an uncommon growth, and usually appears in middle age.

Symptoms.

The patient will not complain of the growth unless it becomes ulcerated, or presses on the urethra, or is a cause of dyspareunia, or of discomfort, if it projects through the vulval orifice.

If the tumour becomes ulcerated, the patient will complain of discharge, and perhaps pain.

Signs.

The tumour is smooth, movable, and covered with the normal mucous membrane of the vagina. As a rule it is soft. Fibromata of the vagina are generally sessile; occasionally one may have a pedicle.

Diagnosis.

These growths must be distinguished from sarcomata. A sarcoma is, however, dark in colour, grows more rapidly, soon becomes fixed, and breaks down early.

Treatment.

A fibroma of the vagina is removed quite easily by enucleation, an incision having been made in the first place through the tissues covering the growth. If a pedicle is present, it can be severed with a scalpel or a pair of scissors.

CYSTS.

Cysts of the vagina are not particularly uncommon. Most of them are quite small. Their source of origin cannot always be determined, but the following have been described:

Varieties.—*Implantation cysts*, arising from epithelium buried in a wound caused by labour or operation.

Lymphatic cysts, showing an endothelial lining.

Glandular cysts: Normally there are no glands in the vagina, but occasionally a solitary gland may exist as a developmental anomaly, and then it may undergo cystic transformation.

Hæmatomal cysts, following hæmatomata of the vagina, have been described.

Hydatid cysts may be identified from the nature of their contents. They are generally connected with similar cysts in the broad ligament.

Gartner's duct cysts: These cysts are due to the persistence of Gartner's duct, which commences near the ovary, passes along to the uterus, and in the fœtus can be traced from this organ into the anterior vaginal wall. As vaginal cysts are most commonly found on the anterior vaginal wall, it is probable that the majority arise from Gartner's duct.

Symptoms.

As a rule vaginal cysts do not cause any symptoms, and are discovered accidentally. Rarely they may grow large enough to cause retention of urine, dyspareunia, or obstruction to delivery. If they project through the vulval orifice, their presence will be noted, and occasionally they become inflamed.

Signs.

Most vaginal cysts are sessile. The mucous membrane covering them is atrophied, and their contents are limpid and colourless, like water. Vaginal cysts vary in size from that of a pea upwards. They are generally single.

Diagnosis.

A vaginal cyst on the anterior vaginal wall has to be diagnosed from a cystocele and urethral cyst, and on the posterior wall from a rectocele.

There is usually no difficulty in distinguishing them, as, apart from the normal appearance of the mucous membrane covering the cystocele, urethrocele, and rectocele, a sound can be passed into the two former and a finger into the latter.

Treatment.

If the cysts are small and are not causing any trouble, they do not require treatment. Cysts that are causing trouble must be dissected out. There is danger of wounding the bladder, ureter, or rectum, during the process, according to the position of the cyst.

INJURIES OF THE VAGINA.

Cause.

The vagina may be injured during childbirth, by attempts at criminal abortion, or by an accident or operation.

Childbirth.—The commonest injury is rupture of the perineum, for details of which the student is referred to the companion volume on Midwifery. The vaginal walls may be torn during forceps-delivery, and the tear may extend into the bladder or rectum, giving rise to a vesico-vaginal or recto-vaginal fistula.

If the head of the child during delivery remains too long impacted in the pelvic cavity, the vagina may slough, and the ulceration, extending to the bladder, may produce a vesico-vaginal fistula.

Criminal Abortion.—The vagina has been perforated into Douglas's pouch with instruments used to produce abortion, fatal peritonitis resulting.

Operation.—Any operation on the vagina necessitates its being injured, and secondary carcinoma, from infection with carcinoma cells during a hysterec[illegible] for malignant disease, or cysts due to implantation of epithel[illegible] asionally follow.

Accidents.—In not a few recorded cases the vagina has been wounded by such accidents as the patient falling on a spike, being gored by a bull, or by foreign bodies being pushed up the vagina during a drunken debauch, or by coitus. The vagina may also be injured by an ill-fitting or neglected pessary, a vesico-vaginal fistula being produced.

Vesico-Vaginal Fistula.

Causes.

The commonest cause is carcinoma of the cervix in its later stages ulcerating into the bladder. There are only two other common causes, sloughing after, or injury during, difficult labour and extensive hysterectomy usually for carcinoma of cervix. Very much rarer are syphilitic or tuberculous ulceration and penetrating injuries of the vagina.

Symptoms.

The patient complains of a constant dribbling of urine, the passage of which over the vulva is the source of much irritation and soreness.

Signs.

The fistula is situated in that part of the vagina which is in apposition with the bladder, so that the urine will be seen to escape through a hole in the upper part of the vagina. The size of the hole varies; it may be so small that it can scarcely be detected, or it may be large enough to admit the tip of the finger. The edges of the fistula are hard and indurated, and if the hole is large enough the mucous membrane of the bladder can be seen projecting through it. There may be an accompanying cystitis.

Treatment.

The fistula can be closed by either a vaginal or an abdominal operation. In the vaginal operation, the edges of the hole may be freshened, after which they are approximated with catgut sutures. Another method is to separate the bladder from the vagina by a flap-splitting operation, and, after freshening the edges, to suture the bladder and vagina separately, the advantage of this operation being that the edges, owing to the division of the cicatricial tissue in their neighbourhood, are not under such tension. If these operations fail, or in certain cases in which the fistula cannot be exposed satisfactorily, the lesion may be approached by a suprapubic cystotomy, and the edges of the fistula freshened and sutured through the interior of the bladder. In either case closure of the fistula should not be attempted until the cystitis, if present, is cured. A self-retaining catheter should be left in the bladder for a week after the operation.

It is useless to operate on malignant fistulæ. Fistulæ due to tuberculous or syphilitic ulceration may close spontaneously if the disease is cured.

Uretero-Vaginal Fistula.

This injury, when present, is generally caused during the operation of panhysterectomy, the ureter being divided unknowingly, or sloughing later, and the cut end becoming implanted in the roof of the vagina. Rarely this lesion has followed forceps delivery with extensive laceration of the cervix.

Symptoms.

The symptoms are those described under Vesico-Vaginal Fistula, the urine escaping intermittently, as it is ejected, from the vagina. As a rule the escape of urine is not noticed till some days after the operation.

Signs.

The opening of the ureter into the vagina is small, and may be difficult to detect. To distinguish the condition from a vesical fistula, methylene blue should be injected into the bladder, and it will then be noticed that the urine flowing from the vagina is normal in colour.

Treatment.

It is necessary to cure the condition, apart from the discomfort caused to the patient, because the kidney may become infected, via the ureter, from the vagina.

The best operation is to open the abdomen, isolate the ureter, and implant its cut end in the bladder. This is a difficult operation, and is not by any means always successful. A commoner operation is to remove the corresponding kidney, but great care must be taken by a cystoscopic examination to determine which ureter is damaged and that the kidney of the unaffected side is efficient; otherwise, as has happened on more than one occasion, the wrong kidney or the only acting kidney may be removed.

Recto-Vaginal Fistulæ.

Causes.

The commonest cause is complete rupture of the perineum, with incomplete healing, a bridge of tissue being formed at the skin surface of the perineal body below a persisting communication between the rectum and vagina. A less common cause is perforating ulceration of carcinoma of the rectum into the vagina, or of carcinoma of the vagina into the rectum. Injury of the lower part of the posterior vaginal wall, during an operation, is an occasional cause of a recto-vaginal fistula.

Symptoms.

The patient is unable to control the passage of flatus. If she is constipated there may be no incontinence of fæces; but if the motions are loose she will complain of involuntary dribbling of fæces.

Signs.

The size of the fistula varies, and in some cases is only detected with difficulty.

Treatment.

In most cases the fistula is low down, and is best treated by the operation of colpoperineorrhaphy (see p. 584) after division of the bridge of tissue below the fistula, as the perineum is often ruptured in addition. If the fistula is high up, it should be closed by methods similar to those described for vesical fistulæ when operated upon from the vagina. It is useless to attempt to repair a recto-vaginal fistula caused by malignant ulceration.

Perforation into the Peritoneal Cavity due to Criminal Abortion.

In this case the patient will come under observation suffering from septic peritonitis.

The abdomen should be opened and drained, and a drain should be inserted into the vagina through the perforation.

CHAPTER XXXVII

TUMOURS OF THE UTERUS

FIBROMYOMA AND ADENOMYOMA OF THE UTERUS.

Fibromyomata are the commonest new growths of the uterus, and, indeed, form one of the most frequent tumours of the human body, and therefore require very full consideration. They arise in the muscular wall of the uterus, and vary in size from minute seedling growths to enormous masses occupying nearly the whole abdomen, displacing its contents and pushing up the diaphragm and thoracic viscera. They are most often multiple, and are definitely encapsulated—*i.e.*, they are differentiated from the uterine muscle by a loose connective-tissue plane which allows of their being shelled out of their bed in the uterine muscle. As they all arise in the muscular wall of the uterus, to begin with they are "interstitial." With their increase in size, and in consequence of the contraction of the uterine muscle, those developing near the peritoneal or mucous surfaces tend to project more and more towards these surfaces, and to become "subperitoneal" or "submucous." A rough classification is therefore made into interstitial, subperitoneal, and submucous fibromyomata, according to their relations to the uterine wall; and, as there will be seen to be considerable differences in the clinical manifestations of these three groups, the terms, though not capable of accurate definition, are convenient. The projection towards the surface or the cavity of the uterus may continue till the covering of uterine muscle and connective tissue becomes so thin that the tumour is extruded through it, and is covered only by peritoneum or endometrium, as the case may be, and attached only at its base by uterine muscle and capsule. If this attachment remains broad enough to represent the whole base of the tumour, it would be described as a "sessile" subperitoneal or submucous fibromyoma. The attachment may, however, be drawn out into a pedicle of uterine tissue, in which case the tumour would be termed a "pedunculated" subperitoneal or

submucous fibromyoma; in the latter case the commoner designation is "fibroid polypus" (see p. 352).

Structure: *Naked Eye.*—Although these growths are composed of the same tissues as the uterine wall, they form a harder and more compact mass than the uterus itself; so that if a uterus uniformly enlarged by a small fibromyoma, say the size of a golf-ball, is palpated, the presence of the tumour can generally be detected by the feeling of hardness which differentiates the growth from the rest

FIG. 100.—PREGNANCY WITH FIBROMYOMATA.

The cavity of the uterus containing an early pregnancy, and below it an interstitial fibroid of the lower part of the uterine body. The tumour on section shows well the whorled appearance of the muscle bundles.

of the uterus. On section the fibromyoma cuts with a creaking sound, is paler and more fibrous in appearance than the uterine wall, and has a silky, glistening cut surface, which shows a whorled arrangement of the tissue bundles which is very characteristic. On comparing an interstitial tumour with the surrounding capsule of uterine wall, the differentiation is well marked. The muscle fibres in the uterine tissue are pinker, have a more parallel arrangement, and are separated from the growth by a thin plane of loose cellular tissue containing vessels. The tumour is whiter, harder, and its fibres are arranged in the characteristic interlacing whorls

already mentioned, which give it an appearance suggesting an origin from many distinct centres. The consistence of these tumours will be seen to vary considerably as the result of the degenerative changes described later, by which they become soft and cystic, or very hard from calcification. If a section is made through the uterine wall containing an interstitial growth, and continued so as to divide the growth completely, the surrounding muscle retracts, compressing and pushing out the tumour so that its cut surface becomes somewhat convex in shape. Many of the naked-eye features of these tumours are well seen during the operation of myomectomy (see p. 608) for an interstitial fibromyoma. The incision is made through the uterine muscle forming the "capsule" till the loose connective-tissue plane between it and the growth is reached, when the tumour can be shelled out of its bed by merely running the finger along this layer of loose tissue. Till enucleation is completed there is generally profuse bleeding, more especially from large veins in the capsule, which is partially controlled by the muscular retraction which follows almost immediately. The marked shrinkage in the cavity from which the tumour has been removed is easily seen. If the tumour itself is divided, there is scarcely any bleeding, owing to its slight vascularity. A very rare form of telangiectatic fibromyoma with great vascularity has been described in which the growth may not be clearly differentiated from the uterine wall by a distinct capsule. Non-encapsulated tumours, however, are not true fibromyomata, but adenomyomata (see p. 347) or diffuse fibrosis uteri (p. 347). From the character of the blood-supply, it will be evident that the most active growth of the tumour takes place at the periphery. The tendency is for the tumour to die away at the centre, and it will be seen, when the degenerations are considered (p. 314), that the process generally starts in the central portion.

Microscopic Structure.—As their name indicates, these growths are composed of muscular (unstriped) and fibrous tissue. They are often termed "myomata," and though the muscular tissue predominates, the existence of purely muscular growths is doubtful, and hence the term "fibromyoma" more correctly describes their structure. The name in common use is "fibroid," and may be retained for brevity's sake and for clinical descriptions; it suggests the naked-eye appearance, but does not indicate the real pathological structure of these tumours. Microscopically the unstriped muscle cells and the fibrous tissue cells are not easily distinguished unless the sections are stained by Van Gieson's method, when the muscle takes up the yellow picric acid and the fibrous tissue the

pink fuchsin stain. The nuclei of the fibrous tissue cells are not so regular in shape and distribution as those of the muscle cells, and are generally accompanied by much wavy fibrous tissue. The former are often spindle-shaped, stellate, or curved, whilst the latter are straighter, thicker, and more decidedly rod-shaped. In young and rapidly growing tumours the nuclei of the muscle cells are shorter and more ovoid. Owing to the whorled and interlacing arrangement of the muscle-bundles, the cells are cut across in all directions, so that the nuclei appear of many shapes. To see their characteristic appearance, the nuclei of a muscle-bundle cut longitudinally

FIG. 101.—MICROSCOPIC STRUCTURE OF FIBROMYOMA (HIGH POWER).

Interlacing bundles of muscle-fibres are seen cut across in various directions. The variation in shape of the muscle nuclei is seen from the circular form on cross-section to the rod shape on longitudinal section.

ought to be studied. In a bundle cut transversely, the nuclei show the round appearance to be expected from the cross-section of a rod, whilst those cut obliquely will show various shapes between the round and rod-shaped forms. The fibrous tissue is chiefly seen as a stroma between the muscle-bundles, and in old tumours in which active growth has ceased many bands of characteristic wavy fibrous tissue may be seen. Bloodvessels with well-defined walls are few in number, and mostly run in the stroma, but a few vessels of a capillary type are always evident in the wide field of a low power. In old and degenerate tumours, thrombosed vessels and areas of partial necrosis, in which the nuclei do not take up the stain, may be present (Fig. 101).

Cause.

Fibromyomata have been described as originating in the muscular coats of the small arteries in the uterine wall, as minute seedling growths are found to have a small vessel in their centre, and because the disposition of the muscle-bundles is more or less parallel to the vessels. It seems to be going far afield to seek an origin for a tumour, which is largely composed of plain muscle and preponderatingly affects the uterus as compared with other structures in the body, in bloodvessels, which are of universal distribution in the body, and yet elsewhere than in the uterus very rarely give rise to fibromyomata. The matter is, however, purely of academic interest. A much more important question is the causation of fibromyomata, and to it no answer can be given. They arise during the period of active sexual life, though they rarely give rise to symptoms before the age of twenty-five. They may give rise to serious symptoms, and may call for active treatment after the climacteric; but it is doubtful if they ever originate as a new formation once menstruation has ceased. It is the occurrence of degenerative changes in a hitherto unnoticed tumour which directs attention to it at this time of life. Many observers have asserted that the sexual functions influence the development of fibromyomata, and it has been argued that they are more common among unmarried and barren women. There are, however, no satisfactory statistics to support these contentions. It is quite certain that fibromyomata tend to cause sterility; there is no evidence that they are a consequence of sterility. Nor is there any evidence that sexual intercourse has an influence in provoking their growth, though undoubtedly in many cases tumours, which have been unrecognized before marriage, may attract attention after. The one undoubted fact that fibromyomata exercise a distinct preventive effect on child-bearing is easily understood when the result of the growth in distorting and displacing the uterus, and producing changes in the endometrium, is considered.

Varieties.

As has already been stated, fibromyomata are generally multiple. Single tumours occur only in a small percentage of cases; though frequently there is one large growth which causes symptoms, the others being trifling in size and of no clinical importance. The body of the uterus is preponderatingly affected: in less than 2 per cent. of cases the cervix is the seat of the growth. Cervical fibromyomata differ from those in the body in being generally single.

Both corporeal and cervical fibromyomata are divided into subperitoneal, interstitial, and submucous varieties, and it will be well at this stage to consider the special features of each.

Subperitoneal Fibromyoma. Subperitoneal fibroids exhibit more variations in size than any of the other varieties, and are even more generally multiple. They vary from small hard nodules on the surface of the uterus, of the size of a pea or walnut, and of no clinical importance, to enormous masses of 30 to 40 pounds and more in weight, though nowadays timely operation usually intervenes before the tumours have an opportunity of reaching such a size. Once the subperitoneal tumour has escaped from being wholly surrounded by its uterine capsule, it has greater freedom of development; on the other hand, its attachment to the uterus may become drawn out into a narrow pedicle, consisting mainly of the remains of the capsular connective-tissue plane, and so the blood-supply may become scanty and early degenerative changes result in consequence. It is not uncommon, however, to find the uterine attachment well supplied with bloodvessels, large venous sinuses being frequently seen running over the surface of the growth towards its base. Owing to the absence of uterine covering and to their more fibrous character, these subperitoneal growths are, apart from degenerative changes, especially hard and heavy. Subserous tumours as a rule grow up into the abdomen, unless they happen to become incarcerated in the pelvic cavity, and, as they are less closely incorporated with it than the succeeding form, they cause less distortion of the uterus. Naturally, the more sessile will have the greater effect in this direction; and the more pedunculated they become, the less will they disturb the uterus. Sometimes the pedicle becomes long and thin, so that the tumour appears on bimanual examination to be quite independent of the uterus, thus simulating the relations of an ovarian cyst. On the other hand, the upward growth of the tumour may cause considerable traction on the uterus, with marked elongation of its canal. Whilst the possibility of non-involvement of the uterine body and the independent mobility of the tumour must be borne in mind, owing to the multiple character of these tumours all degrees of distortion and displacement may be present. In those cases in which the pedicle is markedly drawn out, torsion, in which the uterus may also be involved, may occur, and result in hæmorrhage into the tissues of the tumour and interference with its nutrition. In these circumstances adhesions to omentum and bowel may be formed, and a fresh circulation to the surface of the tumour developed by which its nourishment is maintained. Occasionally a subperitoneal fibro-

myoma may through attenuation and rotation of the pedicle become completely detached from the uterus, and obtain its vascular supply solely from such secondary attachments. Mobile pedunculated subperitoneal fibroids are specially liable to acquire adhesions to other abdominal contents, probably as the result of continued friction. Intraperitoneal haemorrhage from laceration of thin-walled veins on the surface, interstitial haemorrhage from axial rotation or thrombosis, and degenerative changes, may also cause adhesion.

Fig. 102. Pedunculated Subperitoneal Fibromyoma

Posterior view of the uterus and its appendages, with a subperitoneal fibroid attached by a narrow pedicle to the right cornu; several other fibromyomatous nodules are present, mostly sessile, subperitoneal, and interstitial

Occasionally these hard mobile tumours may be accompanied by slight ascites, such as is more generally seen in the case of ovarian fibroids (Fig. 102).

A retroperitoneal fibromyoma may be described as a subvariety of this form. It arises when the same process of extrusion from the surface of the uterus occurs as in the ordinary subserous form, but from a portion of the uterus uncovered by peritoneum—*e.g.*, the

anterior wall below the peritoneal reflection or the lateral wall between the layers of the broad ligament. This retroperitoneal mode of growth is of clinical importance, as it may cause great disturbance of the pelvic and abdominal viscera, and also may give rise to difficulties in operations undertaken for the removal of the tumour. For example, a retroperitoneal growth growing forward under the utero-vesical fold will displace the bladder upwards, and cause elongation of the urethra and displacement of the ureters. If care is not taken, the bladder may be wounded when the abdomen is opened; difficulty will be experienced in getting the tumour up into the wound, as it will be held down by its peritoneal attachments.

FIG. 103.—INTERSTITIAL FIBROID BECOMING RETROPERITONEAL.

The uterine cavity is scarcely altered in size. Behind it is a large spherical fibromyoma with a thick layer of muscle between it and the uterine cavity, and an indiscernible layer over its outer surface. Its cross-section shows a few cystic spaces due to degenerative changes. In the anterior wall is a small interstitial fibroid.

and it will only be completely exposed after incision of the peritoneal covering and enucleation of the growth from its retroperitoneal bed. Those extending out laterally between the layers of the broad ligament may be even more troublesome. They may expand the folds of the broad ligament, displacing the ureter, so that it may be injured if a careful watch is not maintained throughout the enucleation of the tumour; they may extend between the folds of the mesentery of the pelvic colon or pass behind the cæcum, in which case the bowel will be found stretched over their surface; they may also raise the peritoneum from the posterior pelvic wall

and obliterate the pouch of Douglas. Happily, this retroperitoneal development is not common; it is easy to understand how it gives rise both to serious symptoms from pressure on, and displacement of viscera, and to increased difficulties and risks during operation (Fig. 103).

Interstitial Fibromyoma.—Interstitial fibroids are commonly of small or moderate size; with increasing size they tend to be extruded from the uterine wall, and so fall into one of the other varieties.

FIG. 104. - MULTIPLE FIBROMYOMATA OF UTERUS.

Section of myomatous uterus showing multiple fibromyomata up to the size of an egg, for the most part interstitial and submucous. The uterine cavity is capacious and distorted, and the wall hypertrophied, the whole organ being more enlarged than the mere presence of the tumours would account for.

In those cases in which the growth has developed almost in the middle of the uterine wall, so that it is surrounded by a nearly symmetrical capsule of uterine tissue, the tumour may attain considerable size and yet remain definitely interstitial. They occur with equal frequency in the anterior or posterior wall or fundus, and may give rise to a fairly symmetrical enlargement of the uterus, so as to simulate pregnancy. Enlargement of the uterine body is always, and elongation of its canal is generally, present; there is more disturbance of the uterus and less of the neighbouring viscera than in the preceding variety. On examination they appear less hard

and more elastic than the subperitoneal, and affect the uterine functions more decidedly, as will be seen when the symptoms of fibromyomata are considered (Fig. 104).

Submucous Fibromyoma.—Submucous fibroids are tumours, primarily interstitial, which have developed so close to the cavity that they have come to project into it, and so become submucous. It is impossible to draw a definite line between an interstitial fibroid which makes the uterine wall bulge into the cavity, and a definitely submucous tumour. So far is this the case that an interstitial growth projecting into the uterine cavity is often described as "partly submucous" or as "becoming submucous." Roughly

FIG. 105.—SESSILE SUBMUCOUS FIBROID IN PROCESS OF BECOMING PEDUNCULATED.
The uterus in this case was removed after previous operations for the enucleation of other submucous tumours and for the removal of a fibroid polypus.

speaking, a tumour may be described as purely submucous when the major portion of it has been extruded from the uterine wall into the cavity. At first it is still enclosed by a recognizable layer of muscle, and is therefore still "encapsulated"; but the capsule may become progressively thinner on the projecting surface until the tumour is extruded through the capsule so that it becomes "free," being covered only by endometrium. As a rule they are of smaller size than either the interstitial or subperitoneal: with large tumours extrusion into the uterine cavity is more difficult. Submucous fibroids are generally rounded or ovoid in shape, and their chief characteristic is their tendency to pedunculation. Once a tumour projects decidedly into the cavity, it acts as a foreign

body in stimulating the uterus to contract and effect its expulsion. Thus submucous tumours tend to be driven more into the cavity and to become polypoid. This is especially the case when the growth has become free; so long as there is a distinct muscular capsule to resist extrusion, the tumour will remain sessile, and, as its growth meantime continues, the largest tumours of this variety are these sessile encapsulated ones. They are frequently solitary, and cause symmetrical enlargement of the uterus. When a submucous fibroid becomes polypoid, it is covered by endo-

Fig. 106. Submucous Fibromyoma.

The uterine cavity has been opened from behind, showing its enlargement by a sessile submucous fibroid growing from the anterior wall. The cervix is dilated so that only a rim of external os is left; below it the vagina is also dilated. The lower pole of the tumour shows slight superficial necrosis and ulceration.

metrium on its free surface, on its sides by endometrium and thinned-out remains of capsule, whilst its base rests on the capsular bed in the uterine wall. When it is so far extruded as to hang from the uterine wall by a definite stalk, it is known as a "fibroid polypus," the pedicle representing the drawn-out fibro-muscular capsule, and containing the few vessels which nourish it. This blood-supply is poor, and hence these polypi are liable to ulceration and necrosis. The uterus behaves to these polypi much as it does to a dead ovum —*i.e.*, its contractions bring about the opening up of the cervical canal and expulsion of the mass into the vagina. This results in greater elongation and attenuation of the pedicle and greater liability

to ulceration, sloughing, and infection of the tumour. This will be discussed in greater detail in the chapter on uterine polypi (p. 348).

Fibromyoma of the cervix has already been mentioned as much less common. As in the case of the body, they may be subperitoneal, interstitial, or submucous. They are nearly always single, though sometimes other tumours may be present in the body of the uterus. They cause great elongation and distortion of the cervical canal, and displace the body and fundus of the uterus upwards.

Fig. 107.—Large Cervical Fibroid (Weight, 8 Pounds).

The tumour is growing in the posterior lip of the cervix, the tissues of which are stretched out over it. The body of the uterus above is uninvolved. The anterior lip of the cervix is stretched out into a thin band and the cervical canal greatly elongated.

If they exceed the size of the fœtal head at term, they cause symptoms from pressure on the surrounding structures, especially the urethra.

The subperitoneal growths arise from the supravaginal cervix, and extend into the cellular-tissue spaces of the pelvis, so that they are, strictly speaking, retroperitoneal. They may grow downwards into the recto-vaginal septum, laterally into the broad ligaments, or forwards between the cervix and bladder. They may have either

a sessile or pedunculated attachment to the cervix. The interstitial growths expand the cervix so as to obliterate its projection into the vagina and the vaginal fornix on the side on which they form, the opposite lip of the cervix being stretched out and thinned so as to form a knife-edge. This makes the os uteri difficult of recognition. For example, if the tumour grows in the posterior lip, the os is high up in front; the posterior lip is stretched out over the growth, causing exposure of its mucous lining; the thinned-out anterior lip is discovered as a thin sharp-edged flap covering the elongated opening of the canal. The submucous varieties are the rarest and smallest.

Rate of Growth of Fibromyoma.—The uterine fibromyoma is a slow-growing tumour. Often by the time the patient comes under observation the presence of a tumour has been known to her for some years, and in case of subperitoneal fibroids it is very often merely their gradual increase in size which ultimately determines the patient to seek advice and submit to operation. Sometimes for years scarcely any increase in size will be noted. On the other hand a rapid increase may occur from secondary changes (see Chapter XXXIII.), or in rare cases from unusual activity of new tissue formation. On the whole it may be said that the interstitial tumours, probably from their more active blood-supply, grow quicker than the subperitoneal or submucous. Menstruation appears to cause a slight temporary enlargement from increased vascularity, as is shown by retention of urine as a pressure symptom occurring occasionally at first only at the commencement of each period (see p. 323). Pregnancy sometimes results in increased growth (p. 337). After the menopause fresh tissue formation comes to an end, and the tumour may become stationary, or may undergo degenerative changes, or may atrophy. If the last occurs, the muscular tissue disappears with the diminished vascularity and the tumour appears to become more fibrous and to shrink or undergo a form of dry necrosis, often with calcification.

CHAPTER XXXVIII

TUMOURS OF THE UTERUS—*Continued*

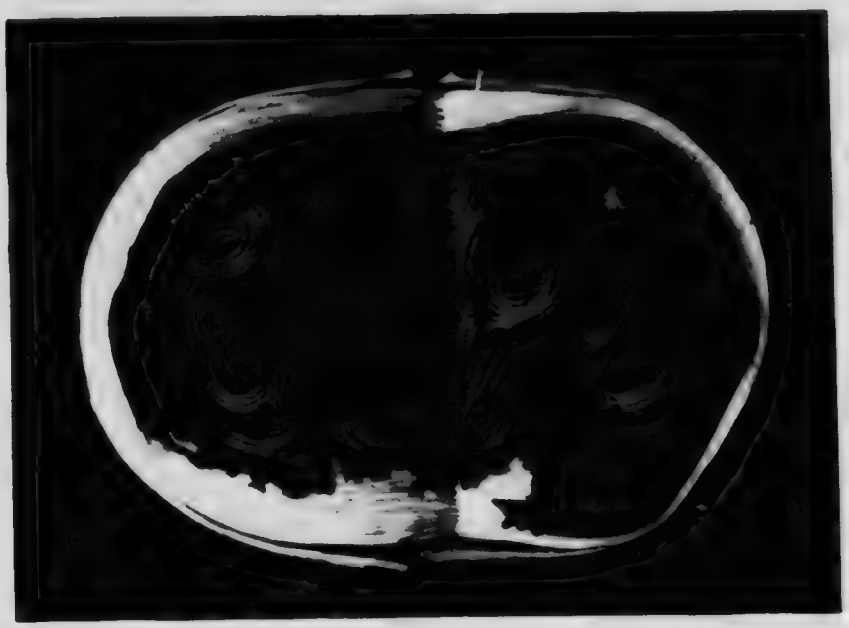
SECONDARY CHANGES IN FIBROMYOMA.

These changes take place after the active growth of the tumour has ceased, from interference with its blood-supply or after the climacteric, or as the result of pregnancy, injury during labour, infection, or malignant change.

1. **Atrophy** is much rarer than was formerly described, especially among tumours larger than an orange. In the smaller tumours it is not so rare, and is caused by interference with the blood-supply, either from compression by the capsule as the result of uterine contraction—*e.g.*, after pregnancy or the prolonged administration of ergot—or, in a pedunculated subperitoneal fibroid, by compression of the vessels in its pedicle or in consequence of the generally diminished circulation to the pelvic organs which follows the cessation of menstruation. The muscular tissue is more particularly affected in atrophy, and the fibrous tissue appears to contract, so that the tumour becomes smaller and harder, and may ultimately become unrecognizable to clinical examination. This disappearance of the tumour is so rare that the possibility of its occurrence cannot be counted on in considering the question of the treatment of fibromyomata. The next two forms of degeneration may occur with post-climacteric atrophy.

2. **Fatty degeneration** is rarely met with to a degree appreciable to the naked eye, though sometimes in tumours showing other retrogressive changes soft yellow patches of fatty degeneration may be seen. Usually only a slight degree of diffuse fatty degeneration is present.

3. **Calcification** is frequent in what may be described as the dry forms of retrogression. It may occur either as calcareous patches in the tumour, which in the early stage may only be noticeable by a "grittiness" on section, or as a thin shell round the periphery. The eggshell form is frequently found in tumours which have undergone a dry or a fatty necrosis. The interior of the growth is somewhat putty-like in character, greasy to the touch, and frequently



NECROBIOSIS OR RED DEGENERATION

stained a greenish-yellow colour. Gritty patches are frequently found in the central portions. Occasionally the whole tumour becomes converted into a calcareous mass, the "womb-stone" of the older authors. Calcification is met with for the most part in elderly patients, and is most common in subperitoneal tumours (Fig. 108).

4. **Necrobiosis,** either partial or complete, occurs to some extent in all the retrogressive changes in fibromyomata. Foci of necrosis are not infrequent, especially among the larger tumours, and may break down into irregular cavities containing fluid débris. Such necrotic areas are probably caused by thrombosis and infarction or

Fig. 108.—Calcified Interstitial Fibromyoma.

Patches of superficial and branching areas of deeper calcification are seen.

other circulatory disturbance. The term necrobiosis is, however, reserved more particularly for that form, sometimes called "red degeneration," in which the affected area is stained a blood-colour, so that it looks like a piece of raw meat. It begins in the centre of the tumour, the part farthest from the blood-supply, and generally affects the whole mass, though areas on the periphery may escape, and, by the contrast of their white appearance with the red of the necrotic portions, show up very distinctly. The shade of colour varies from a pink to a dark red (see Plate VII.). The freshly cut surface has a sickly odour, which has been compared to that of stale fish. This necrobiotic change has given rise to much investigation as to its exact nature and causation. Hæmorrhage may be present, but it is not usual, and never in sufficient quantity to

account for the general staining of the tissue, which seems to be due to hæmoglobin. Thrombosis of the vessels has been noticed, but whether it is of primary or secondary occurrence is uncertain. Necrobiosis seems to be a more acute process than the other necrotic degenerative changes, and occurs with marked frequency in pregnancy and the puerperium, though seen also in nulliparous women. As it is a more acute process, it gives rise to acute symptoms more often than the other retrogressive changes, but sometimes is found without any symptoms whatsoever. A bacterial cause has been sought for, but without success, and the extensive hæmolysis occurring in tumours affected in this way is not as yet satisfactorily ex-

Fig. 109.—Microscopic Section of Degenerate Fibromyoma (Low Power).

The upper degenerate area has not taken up the nuclear stain, and appears paler than the lower less affected area. The arrangement of the muscle-fibres in bundles is well seen, and bloodvessels with well-defined walls and a few capillaries are present.

plained. A necrobiotic fibromyoma is softer and more cystic to palpation than the ordinary hard growths, and microscopically all that is discovered is the death of the cellular elements, as shown by their no longer taking up the nuclear stains, while the wavy fibro-muscular bundles are still evident and arranged as in an unaffected growth (Fig. 109). Fat globules and lipoids are found. In the larger tumours liquefaction and the formation of cystic spaces containing a brown fluid may occur in the later stages; in small tumours a small putty-like, structureless material, often stained by a greenish hue, and somewhat greasy to the feel, may represent the end stages of this necrotic process.

Another form of necrobiosis with disintegration results in the formation of irregular cavities containing a puriform fluid resembling the contents of an abscess, but containing neither bacteria nor pus cells.

In the case of submucous tumours, especially fibroid polypi, necrosis is liable to result from deficient circulation due to uterine contraction, or constriction of the pedicle, and in such cases the exposed surface is liable to bacterial invasion. A sloughing submucous fibroi may thus give rise to an extremely offensive discharge.

5. **Mucoid and hyaline degenerations** are the most frequent degenerative processes met with in fibromyomata. The tumour is softer than usual, and the tissues appear full of fluid, so that the early stages are often described as "œdema." To begin with, the changes are most marked in the fibrous tissue running between the muscle-bundles; it softens and shows numerous spaces containing a yellow, viscid, sometimes gelatinous fluid. The tumour has a slightly spongy consistence, so that the finger can be pushed into the spaces between the whorls of muscular tissue, and fluid will exude slowly from the tumour after it has been cut open. The muscular tissue is affected later, and undergoes a liquefaction, so that irregular cavities are formed, often with septa of the original tissue stretching across them. This change takes place irregularly throughout the growth, and does not appear to start in the centre as with the necrobioti hange.

Microscopically this process is seen to begin as a hyaline transformation of the connective-tissue stroma, with loss of fibrillation. Liquefaction with disappearance of the cells occurs, resulting in the formation of small cavities, which become larger by fusion and the further breaking down of their walls. Whether the muscle cells also undergo a similar transformation, or merely undergo a degenerative atrophy, is uncertain: probably the former occurs: in any case they disappear. In the early stages of this degeneration the naked-eye appearance is simply that of patches of viscid fluid among the connective-tissue bundles; later the tumour has a somewhat honeycomb appearance in patches, and in its final stages it is described as a fibro-cystic tumour, because it is then made up of large cavities with irregular ragged walls.

The fibro-cystic tumours almost invariably arise from some form of retrogressive change, most commonly from mucoid degeneration, more rarely from necrobiosis. There is a certain amount of general watery infiltration of the growth, but the cystic character of the tumour is more particularly caused by the formation of false cysts,

as described above, with irregular walls formed by the non-disintegrated portions of the fibromyomatous tissue. The cyst wall has no epithelial lining, and the contents vary greatly; it may be a clear yellow fluid which coagulates readily after evacuation; or it may be of a dark chocolate colour from blood extravasation; in some cases it is exactly like thick pus. Occasionally a thin watery fluid is present, and in some of these cases a true endothelial lining is found, showing that they are formed from distended lymph spaces, and specimens in which this condition has been marked and general have been described as a "lymphangiectatic cyst." The pathology

FIG. 110. PORTION OF INTERSTITIAL FIBROID SHOWING CYSTIC DEGENERATION.

The tumour contains small cystic spaces, many of them irregular and branching. Between the growth and the uterine wall, best marked on the left, is seen a space of similar nature to those in the tumour itself, formed by the degeneration of the connective-tissue layer separating the tumour from the uterine wall.

of these lymphatic cysts is obscure; some dilatation of the lymphatics is not uncommon with other cystic degenerations in fibromyomata. For example, it is not uncommon to find the peritoneum of the broad ligament, especially in the neighbourhood of the uterine vessels, raised by collections of lymph so as to form blebs of yellowish fluid, and this is most frequent with fibro-cystic growths. The fibro-cystic change is most common in subperitoneal tumours, and rarest in the submucous; it may be found at any age, but as a retrogressive phenomenon is naturally more usual in older patients, and is frequently met with after the climacteric. It may result in the formation of very large tumours, weighing several stone, and gives

rise to many special symptoms and physical signs which will be described later (Figs. 110, 111).

6. **Torsion of the pedicle** of a subperitoneal fibromyoma has been mentioned as an occasional occurrence (see Fig. 102). In a marked case the venous congestion causes the tumour to become of a spleen-like colour from extensive extravasation of blood into the tissues. If the uterus is involved in the rotation, obstruction to the cervical canal, with the formation of a hæmatometra, may result. Acute symptoms, much like those of the more common axial rotation of an ovarian cyst, will be caused, and sloughing may occur. More

FIG. 111. CYSTIC DEGENERATION.

The upper part of the uterus, with an interstitial fibroid containing an irregular cavity with a honeycomb-like structure in places. The fluid it contained was straw-coloured. The tumour is growing in the anterior wall of the uterus.

usually, however, the formation of adhesions to omentum and elsewhere results in a fresh blood-supply to the surface of the tumour.

7. **Infection of a fibromyoma** is rare except in the case of submucous tumours and fibroid polypi (p. 343). The infection may occur from the endometrium in submucous growths, and more rarely in interstitial; from the peritoneal surface in subperitoneal and, again more rarely, in interstitial growths; or from a general blood-infection. The common way is from the endometrium, and it can be easily understood that a submucous tumour, especially if its

nutrition is interfered with by strangulation or injury, would have little resistance to bacterial invasion if exposed in becoming pedunculated, after labour, abortion, or such operative interference as curetting, or if the endometrium was infected in any way.

From the peritoneal surface, infected and adherent Fallopian tubes, an inflamed appendix or adherent bowel are possible causes. Infection from the blood-stream may occur as part of a general infection of the uterus after labour, and may thus involve any variety of tumour, subperitoneal and interstitial as well as submucous; or as part of a general septicæmia, in which case the local symptoms may or may not be a prominent feature. Actual suppuration as the result of invasion by pyogenic organisms is extremely rare; it may result in the discharge of matter by adhesion and evacuation through the bowel, the skin of the abdominal wall, the bladder, or *per vaginam*. Rupture into the peritoneal cavity and general peritonitis is unlikely, as extensive adhesions are formed in such cases, so that a local intraperitoneal abscess and secondary rupture into bowel or on the surface would usually occur.

In the case of submucous fibroids infection will be seen to result in sloughing and extrusion. Gangrene has been described as a consequence of infection of interstitial and subperitoneal fibromyomata.

8. **Malignant Change.**—A fibromyoma may become secondarily affected by carcinoma or sarcoma arising primarily elsewhere in the uterus or in the adjacent pelvic or abdominal organs, but a much more difficult point is the possibility of a sarcomatous transformation of the simple elements of a fibromyoma. A sarcomatous growth may arise in a uterus which is the seat of a fibroid either from the connective tissue of the uterine wall, the endometrium, or the fibroid itself. There is no satisfactory evidence of a general transformation of fibromyomata into sarcomata. Sarcoma may arise in a fibroid, and in recorded cases has usually been discovered in patches amidst the simple growth. As these areas are usually small, and therefore easily overlooked, it has been argued that the occurrence of sarcoma might be found to be more frequent if a systematic examination were made of all fibromyomata. Our present experience, clinical and pathological, warrants the statement that such a change is possible and does occur, but it is so rare that it scarcely need be taken into consideration in discussing the future possibilities of these tumours.

Many of the cases of what have been described as recurrent fibroids are probably sarcomata. For the most part they are sub-

mucous tumours or polypi, which have returned after repeated enucleation or excision.

Carcinoma cannot arise primarily in a tissue without epithelial elements, and cases recorded as malignant epithelial changes, when recorded as arising in fibroids, probably originate from adenomyomatous elements in the tumour.

Malignant disease may occur in a fibromyomatous uterus, and may infiltrate the tumours as well as the uterine tissues; but this ought not strictly to be described as a malignant change in fibromyomata. It has, however, been stated that fibromyomata predispose to the occurrence of carcinoma uteri, and, as this matter is of considerable moment in prognosis and in deciding the question of operation and the extent of the operation for fibromyomata, it requires a little consideration. Carcinoma of the body, a rare disease compared with carcinoma of the cervix, is relatively more frequent in association with fibroids than is the much commoner carcinoma of the cervix. Also hyperplasia of the endometrium, often with the formation of adenomatous polypi, is a common accompaniment of fibromyomata, so that with these changes and the increased vascularity, as shown by the uterine hæmorrhages, an increased tendency to malignant adenomatous change might be considered as not unlikely. It must, however, be remembered that carcinoma of the body has a much later age-incidence than carcinoma of the cervix, and occurs more among the nulliparous; while cervical cancer preponderatingly affects younger and parous women, in whom the growth of fibroids is less common. Further, cases of association of fibromyoma and cancer of the body often occur after the climacteric in women with an atrophic and symptomless fibroid. Statistics are of little assistance, because they only relate to cases in which operation has been performed, and neglect the large number of fibroids not operated on. Without denying that fibromyomata may favour the development of carcinoma, it can safely be asserted that their influence is so slight as not to be worthy of consideration in estimating the prognosis in cases in which these tumours are treated expectantly. On the other hand, recurrence of hæmorrhage after the climacteric ought to bring this possibility to the front, and such hæmorrhage ought not to be dismissed as being due to innocent fibromyomata until, at any rate, thorough exploration of the uterine cavity has excluded malignant disease there.

CHANGES IN THE PELVIC AND OTHER ORGANS PRODUCED BY FIBROMYOMA.

The enlargement of the uterus and its cavity caused by the growth of fibromyomata has already been mentioned. The degree of this depends on the situation and size of the tumours. A pedunculated subperitoneal fibroid may cause little or no change in the size of the uterine body, and no enlargement of the cavity. A cervical fibroid also may leave the cavity and body of the uterus unaltered, though the sound may pass much more than the normal distance owing to elongation of the cervical canal. An interstitial growth will naturally cause enlargement of the body proportionate to its size, and distortion of the cavity according to its situation. The enlargement of the cavity will usually be considerable, but the amount will depend on the situation of the growth. If it is in the fundus, for example, it may push the cornua out without greatly enlarging the cavity; if it is in the middle of the uterine body, the cavity will be enlarged in proportion to the general increase in size of the uterus. If there are several tumours, the cavity will not only be enlarged, but displaced, sometimes so that the canal becomes irregular. An interstitial fibroid generally elongates the cavity, whilst a submucous fibroid distends it. There is often considerable hypertrophy and increase of the uterine musculature owing to the presence of fibromyomata, and changes in the endometrium are frequent. Except with cervical and subperitoneal tumours, some hyperplasia of the endometrium commonly accompanies those tumours; this is often described as "adenomatous overgrowth." The endometrium is thick and pulpy, and the hyperplasia may be so marked as to result in the formation of polypoid masses. This change is, however, by no means constant, and a smooth thin endometrium is not infrequently found even with extensive interstitial and submucous fibromyomata. Many observers have endeavoured to show that certain changes in the ovaries and Fallopian tubes are caused by uterine fibromyomata, but the evidence on this point is far from conclusive. It is not uncommon to find the fimbriated end of the tube closed and adherent, and the tube distended, forming a hydrosalpinx of some size; occasionally a pyosalpinx may be present, but it is not easy to say whether this is in any way due to the fibroid. The occurrence of hydro- and pyo-salpinx with uterine fibromyomata seems to show that at any rate there is an increased tendency to infection of the uterine appendages. Degeneration of the myocardium has been ascribed to the growth of uterine

fibromyomata, but is more correctly an effect of the secondary anæmia produced by excessive uterine hæmorrhage. Digestive disturbances are probably due to pressure on, and displacement of, the abdominal viscera, and are better studied with the true pressure effects.

PRESSURE EFFECTS CAUSED BY FIBROMYOMA.

Various disturbances due to the pressure of the tumours on pelvic and abdominal structures or displacement of viscera may be grouped together under this heading. Of the viscera, the bladder is the one whose functions are most often affected. The uterus enlarged by fibroids and lying forward on the fundus of the bladder will cause, just like the early pregnant uterus, frequency of micturition. This is usually more marked when the patient is up and about than when she is in bed, because then the weight of the enlarged uterus rests more decidedly on the distending bladder. But the most marked pressure symptoms are caused by tumours which fill up the pelvic cavity, displace the neck of the bladder, and elongate the urethra. Most commonly these are tumours of the posterior wall, which fill up the sacral hollow and push the cervix and body of the uterus upwards and forwards; or tumours of the fundus, which retrovert the uterus and occupy the pouch of Douglas; or the rarer growths of cervical origin, which are especially liable to cause pressure effects. In these cases difficulty in micturition and retention of urine are produced, just as in the case of a retroverted gravid uterus; indeed, in the second of the two conditions just mentioned the physical condition is exactly similar, the only difference being that the uterine enlargement is due to fibromyomata, and not to pregnancy. The common factor in these cases of retention is that the cervix is pressed up towards the symphysis, so that sometimes it lies above it, and the neck of the bladder is pressed upwards and forwards, and the urethra put on the stretch. Retention of urine is the most characteristic symptom of "incarceration" or "impaction" of a fibroid in the pelvis. As the tumours grow slowly, this symptom very often develops gradually. There may be increasing difficulty in micturition, and then an attack of complete retention; but sometimes there is no period of difficulty, and the first warning is a sudden attack of retention. This may occur at the onset of a period, when possibly the slight engorgement of the tumour may just suffice to cause impaction; and then, after full establishment of the flow, the retention disappears, to return again with the succeeding period. Pressure on the ureter, generally

where it crosses the pelvic brim, may result in dilatation of the ureter, and lead to hydronephrosis or atrophy of the kidney. The functions of the rectum are much less affected by pressure from fibromyomata: the bowel may be pushed to the side and flattened out, but intestinal obstruction from this cause is almost unknown. A few isolated cases of obstruction of the bowel by calcified fibroids have been recorded, in some of which perforation of a stercoral ulcer has occurred, but they are too rare to require consideration. Constipation is often ascribed to pressure, but it is so frequent a symptom among women, and especially among those with abdominal as well as pelvic tumours, that grave scepticism is justified before accepting pressure on the bowel as the reason. Probably it is merely part of the general nervous and physical sluggishness which accompanies the development of these growths, and this is proved by its frequent persistence after their removal, until, at any rate, the patient's general health is fully restored and her former activities resumed. In a few cases adhesions, such as are not uncommon with subperitoneal tumours, may aggravate the constipation. Sciatica and shooting pains down the legs from pressure on nerves, varicose veins, hæmorrhoids, thrombosis and swelling of the feet from pressure on veins, may also arise. Large tumours which have risen up into the abdomen give rise to much less in the way of pressure symptoms than those remaining in the pelvis. Except for a sense of weight and discomfort, they do not give rise to pressure symptoms till they occupy the greater part of the abdomen and cause marked distension. They may then cause some disturbance of digestion from displacement of the stomach and intestines, and, in extreme cases, disturbance of cardiac action and respiration by pushing up the diaphragm.

For the effects on pregnancy, labour, and the puerperium, the reader is referred to p. 224 in the textbook of Midwifery by Ten Teachers.

CHAPTER XXXIX

TUMOURS OF THE UTERUS—*Continued*

SYMPTOMS, SIGNS, AND DIAGNOSIS OF FIBROMYOMA.

Symptoms.

Uterine fibromyomata may not give any indication of their presence, and it is not uncommon to discover tumours up to the size of a fœtal head and over, in the course of a routine examination or of an operation undertaken for some other condition, or at a post mortem examination, which have given rise to no symptoms.

The symptoms which they cause vary with the size and position of the tumours, the presence of degenerative changes, and other factors, so that the simplest plan is to consider the symptoms in general and then to discuss them specifically as found in different conditions.

An abdominal tumour is sometimes the first thing to make the patient seek a medical opinion. It is so hard that it often attracts attention before any general abdominal enlargement is noticed, especially if a feeling of discomfort in its neighbourhood should lead the patient to investigation. The tumour is not as a rule sensitive, and rarely gives rise to pain, but occasionally backache and a feeling of weight are complained of. Menstruation may be attended with pain.

Uterine hæmorrhage is another frequent cause of patients seeking advice. The characteristic form of hæmorrhage with fibromyomata is a progressive menorrhagia. For some time, perhaps, only a slight increase in the menstrual loss will be noticed; then the periods, from lasting, say, one week, will last ten days or a fortnight, until in severe cases a clear interval of a week or less may be all that is allowed to the patient. The loss not only lasts longer, but at times, at any rate, is much more profuse than normal, and accompanied by the passage of clots. Intermenstrual bleeding is unusual, except in the case of submucous fibroids in the course of extrusion (p. 70), and its absence suggests fibromyoma as the cause of the bleeding rather than carcinoma. The degree of menorrhagia caused by

fibromyomata seems to depend on the proximity of the tumour to the uterine cavity. Subperitoneal growths rarely affect the menstrual loss at all; interstitial growths usually cause considerable increase in the menstrual loss, but may not affect it; with submucous fibroids menorrhagia is nearly always present, and quite small tumours—*e.g.*, the size of a walnut—may provoke sufficient loss to cause marked secondary anæmia. The size of the tumour in itself has little relation to the amount of bleeding caused; it is its proximity to the uterine cavity which seems to be the determining factor in producing menorrhagia. A subperitoneal growth the size of a full-time pregnancy may not affect menstruation, while a small submucous tumour may cause almost continuous hæmorrhage. The loss is most profuse during the conversion of submucous fibroids into polypi or after the formation of a fibroid polypus, suggesting that the tumour acting as a foreign body, and the muscular activity of the uterus in expelling it, are factors in the production of irregular hæmorrhage. Other causes of rapid increase in the loss are degenerative changes and the occurrence of malignant disease in the uterus. The increased area of endometrium from which bleeding occurs, the hyperplasia of the endometrium which has been mentioned as frequently accompanying the growth of fibroids, and the increased circulation to the uterus, would naturally be expected to give rise to some degree of menorrhagia. Floodings severe enough to endanger the patient's life are exceedingly rare, though not unknown; but long-continued uterine hæmorrhage leads to a marked secondary anæmia, with serious consequences to the health. Women who have suffered for many months do not show the extreme pallor which is seen after, *e.g.*, the severe losses of an incomplete abortion; but they have a distinct loss of colour in the lips and conjunctivæ, and the complexion is often sallow or of a peculiar lemon tint, sometimes with a pink flush over the malar bones, which is characteristic of a long-continued loss of blood greater than the body can readily replace. Symptoms secondary to the anæmia, such as palpitation, shortness of breath, digestive disturbance, and physical weakness, may be present to a considerable degree in these cases. Patients over forty may express a hope that their troubles will soon cease with the climacteric, but this is often disappointed, as another result of fibromyomata causing menorrhagia is to postpone the onset of the menopause, and the age of fifty-five is frequently reached before its occurrence. Hæmorrhage after the climacteric should always suggest that carcinoma may have supervened, and lead to a thorough examination of both cervix and body.

Leucorrhœa not infrequently occurs, with or without increased menstrual loss. It is especially liable to occur with submucous tumours when accompanied by enlargement of the cavity and thickening of the endometrium. Some excess of secretion from the cervical glands generally accompanies fibromyomata of the body as well as those of the cervix. In these cases there is much thick glairy mucous with it. Very offensive discharges accompany sloughing submucous fibroids.

Pain is only occasionally present. It may be due to pressure on nerves, in which case it is generally sciatic in distribution; pain in the tumour itself is generally an indication of secondary changes of some kind or of local peritonitis around it.

Disturbance of micturition and other symptoms, as described under "Pressure Effects," are most common with pelvic tumours. Retention is generally due to incarceration in the pelvic cavity.

Chronic ill health, in which is included dyspepsia, constipation, neurasthenia, and general disability, in many cases follows the long-continued presence of fibromyomata.

In cases of degenerate tumours this ill health may be due to absorption of toxic products from the breaking-down growth, but more often it is consequent on anæmia or is simply the accumulated result of the discomfort and disturbance caused by the growth of the tumour.

Symptoms in Specific Varieties.

Subperitoneal Fibromyoma.—Subperitoneal fibroids more than any other variety may reach considerable size without causing any inconvenience to the patient, and this form is most frequently found accidentally on casual examination of the abdomen or pelvis. They rarely have any influence on menstruation, and usually the only symptoms are purely mechanical in origin—*i.e.*, due to pressure on, and displacement of, adjoining structures. Hence disturbances of micturition and of the digestive tract, hæmorrhoids, varicose veins, and sciatica, are found. In rare cases axial rotation may occur, and give rise to severe abdominal pain with sickness and collapse, as in the case of a similar accident to an ovarian cyst. The tumour in such cases becomes engorged with blood. Another rare accident is intraperitoneal hæmorrhage from rupture of thin-walled veins on the surface of the tumour. This gives rise to abdominal pain, shock, and the signs of internal bleeding. Tumours growing retroperitoneally are especially likely to produce pressure symptoms with disturbances of micturition. They are also more prone to cause

displacement of, and pressure on, the ureters, and so start renal changes.

Interstitial Fibromyoma. — Interstitial fibroids, being intermediate between the subperitoneal and submucous varieties, may exhibit the symptoms of either. They may cause menorrhagia, dysmenorrhœa, leucorrhœa, and pressure symptoms.

Submucous Fibromyoma. — The characteristic symptom of submucous fibroids is uterine hæmorrhage, at first a progressive increase of the menstrual loss, but later intermenstrual bleeding may occur. As small tumours, especially during extrusion as polypi, give rise to severe hæmorrhage, submucous fibroids come earlier under observation than the other varieties, and hence are generally removed while still small. The hæmorrhage may amount to a serious flooding, and the rare cases of fatal bleeding from fibromyomata have occurred with submucous growths or fibroid polypi. Profound secondary anæmia and its general effects are, therefore, more marked with this variety than with any other. Leucorrhœa is often present also, and is generally more watery in character than the common form of purely cervical origin; this is due to the excess of the more watery secretion from the corporeal endometrium. Fœtor of the discharge is evidence of sloughing. Dysmenorrhœa is a common accompaniment, and pains like those of abortion may be present during extrusion. Otherwise pain is not a characteristic symptom, nor are pressure effects. Pregnancy is very rare when submucous tumours are present: the onset of the climacteric is markedly delayed.

Fibromyoma of the Cervix.—A cervical fibroid does not affect the uterine body, and therefore rarely causes hæmorrhage; but considerable leucorrhœal discharge of a mucoid nature is usually present, owing to the elongation and exposure of the cervical mucous membrane. Dysmenorrhœa may also occur. The characteristic symptoms of these tumours are those due to pressure on, or displacement of, the bladder and ureters. From their position, they naturally form a very serious obstruction to labour or to the evacuation of an incomplete abortion

Symptoms caused by Secondary Changes in Fibromyomata.

Atrophy will obviously tend to the disappearance any symptoms previously present.

Calcification, also, so far as it is associated with any special alteration in the symptoms, will have a similar tendency. Occasion-

ally, however, calcified tumours may give rise to severe pain from pressure, and, among the few cases recorded in which obstruction of the bowel has resulted from fibroids, calcification has been present in an unusual proportion.

Necrobiosis and mucoid degeneration are generally associated with a rapid increase in the size of the tumour, pain, and tenderness. There may be a slight degree of fever, with headache, furred tongue, anorexia, and general digestive disturbance, due possibly to absorption of products of disintegration. The necrobiotic change which causes the raw-meat appearance of the tumour on section (p. 315) appears to be a more acute process, and is therefore sometimes accompanied by more decided symptoms; and this is often well seen when it occurs as the result of pregnancy in a fibromyomatous uterus. The symptoms may be so severe as to suggest torsion of the pedicle of an ovarian cyst, and, indeed, this is a not infrequent error in diagnosis. The patient has abdominal pain and tenderness with slight fever and general illness, all of fairly sudden onset.

In fibro-cystic tumours the rapid increase of size and the softened and cystic feel of the growth are the most characteristic features. These may or may not be associated with the other symptoms described above.

Infection gives rise to general toxæmic symptoms, high fever, sweating, wasting, and, in the case of submucous growths, foul discharge. Interstitial tumours very rarely break down and discharge by the uterine cavity.

Sarcomatous change will cause a rapid increase in the size of the tumour. Carcinomatous invasion or accompanying carcinoma of the body will result in severe and irregular hæmorrhage with discharge.

Signs and Diagnosis.

A physical sign without which the diagnosis of fibromyoma cannot be definitely made is the enlargement of, or the presence of a tumour in connection with, the uterus. The special characters of the enlargement or tumour will differ with the size, position, and nature of the fibroid. A symmetrical enlargement of the uterus is only seen with submucous growths projecting into and distending the cavity, and with interstitial growths of small or medium size. The organ is of harder consistence than when the enlargement is due to pregnancy, unless degenerative changes have occurred, in which case care is required in making a differential diagnosis. The uterine cavity is markedly elongated, so that the sound may pass

4, 5 or 6 inches, or more, if its passage is not obstructed by a projecting portion of the tumour. More often the uterine enlargement is asymmetrical; the tumour does not occupy a median position in the abdomen; it is irregular and nodular on the surface owing to the frequency of multiple growths. It is sometimes possible on bimanual examination to recognize that the uterine body occupies an eccentric position in the mass; the uterine sound, if passed, will show that the uterine cavity runs up one or other side or to the back or front of the tumour. In subperitoneal fibromyomata the body of the uterus may be unaffected, and, if there is well-marked pedunculation, the connection of the tumour with the uterus may not be easily ascertained. Indeed, if cystic change has occurred, it may give exactly similar signs to an ovarian cyst, as the uterus may be found not enlarged, and separate and movable apart from the tumour. The consistence of these tumours is hard; subperitoneal fibromyomata, especially, often feel very hard and heavy. Interstitial and submucous tumours may give a sensation of elasticity, and even a sense of fluctuation, such, for instance, as is obtained across the thigh, which will be more marked by the occurrence of secondary changes, such as œdema or early cystic change. With definite cyst formation true fluctuation, and in rare cases a fluid thrill, may be obtained. In large tumours the consistence may vary, one part feeling hard and solid and perhaps even of stony hardness, if calcification has occurred, and in another part soft and cystic. Occasionally, and more particularly in the case of submucous tumours in the process of extrusion, definite uterine contractions like those of pregnancy may be detected.

In multiple fibroids, when the tumour is irregular with bosses and nodules of various size, one or more of these nodules may be found movable on the main mass, indicating pedunculation. Fibromyomata are not tender to palpation. A uterine souffle, similar to, but not usually as well marked as, that of pregnancy may be heard.

On pelvic examination, the cervix uteri is firm and hard, and often displaced, drawn up, pushed down or to one or other side; its projection may be obliterated by expansion, by a growth of the cervix or lower part of the body, or by its being taken up preparatory to the extrusion of a submucous tumour. Occasionally the os may be dilated and the lower pole of a growth within the cavity felt by the finger. Except in the case of pedunculated subperitoneal fibroids, with the uterus separate and uninvolved, and in that of small interstitial or submucous fibroids, say up to the size of a walnut, in which the enlargement may be so slight as to be scarcely

noticeable (though severe menorrhagia may be present), the enlargement of the body of the uterus or its incorporation with the tumour mass will be definitely made out on bimanual examination. The mass may be abdominal and no part of it felt in the pelvis; in this case pressure by the hand on the abdominal swelling will be communicated to the cervix and felt by the internal finger. The lower pole of the abdominal swelling may be felt at the pelvic brim, and its connection with the uterus recognized by finding that it moves with the cervix. Part of the tumour may be in the pelvis and part in the abdomen, in which case a smooth rounded or an irregular nodular hard mass may be discovered by the internal finger, and its connection with the abdominal tumour and with the cervix determined. Or the fibroid may be wholly pelvic, in which case it may be definitely made out only by internal examination. Abdominal palpation, if it reveals anything, will only show that the pelvic cavity is filled up by a hard mass. In the majority of such cases the growth occupies the roomiest part of the pelvis, the sacral hollow, and either retroverts the uterus, pushing the cervix forwards and upwards so that it may lie at the level of, or above, the symphysis pubis; or it pushes the whole uterus upwards and forwards so that the fundus is palpable above the pelvic brim, and the body recognizable bimanually in front of the mass in the sacral hollow. In the latter case it is not always easy to be certain that the tumour is uterine; the physical signs may be very similar to those caused by an ovarian cyst, or a pelvic hæmatocele, or other new formations in the pouch of Douglas large enough to fill the sacral hollow and cause this forward and upward displacement of the uterus. Fibromyomata in the posterior segment of the pelvis are especially liable to become incarcerated and give rise to pressure symptoms (p. 323). Retroperitoneal and cervical fibroids often take this position. With the latter the cervical canal is greatly elongated, and the unenlarged body is pushed high into the abdomen, where it may be felt movable and independent of the tumour below, and thus suggest a subperitoneal fibroid.

The symptoms caused by secondary changes have already been mentioned—rapid increase in size, softening and tenderness of the tumour (with sometimes pain), slight fever, and toxic manifestations of a minor degree. Increase of size and softening are most marked in the mucoid and cystic changes. The softening goes on to definite fluctuation, and perhaps so far as to give rise to a distinct fluid thrill in large fibro-cystic tumours. Tenderness with pain, slight fever, and toxic symptoms, are frequently seen with acute necrobiotic changes, but are best marked in cases of infection of the

tumour. Sarcomatous change is so rare that it is difficult to say more than that rapid increase in size is the chief feature; but the onset of hæmorrhage after the climacteric, or the recurrence of irregular bleeding in a patient with hitherto quiescent fibromyomata, should always suggest the possibility of concurrent malignant disease, sarcoma or carcinoma.

CHAPTER XL

TUMOURS OF THE UTERUS *Continued*

DIFFERENTIAL DIAGNOSIS AND PROGNOSIS OF FIBROMYOMA.

The simplest plan of discussing the diagnosis of uterine fibromyomata, after the symptoms and physical signs have been described, is to consider the conditions with which these tumours may be confused, and to note the points of distinction. In doing this, it must be recognized that the difficulties in diagnosis will vary according to the size, position, and other characters, of these very variable tumours. For example, with abdominal tumours the problem will differ from that in the case of pelvic growths, and so on.

Uterine Hæmorrhage.—Uterine hæmorrhage, generally of the character of a progressive menorrhagia, has been stated to be a common cause of the patient's seeking advice, and some enlargement of, or a tumour connected with, the uterus has been given as the essential physical sign of fibromyoma. To begin with, the degree of uterine enlargement may be so slight as to elude observation, and other conditions causing uterine hæmorrhage, even if strictly menorrhagic in type, may be accompanied by some enlargement of the body—*e.g.*, subinvolution, chronic metritis, and endometritis. In order to avoid overlooking a small submucous fibroid in cases of menorrhagia with trifling enlargement of the uterus, the cavity should be explored with the finger. With a finger of one hand in the uterine cavity, and the other hand on the abdomen, the wall of the uterus can be felt for anything of the nature of a fibroid. If a small submucous fibroid is found, it can be enucleated; if polypi are discovered, they can be removed; if a thickened endometrium, curetting is indicated; if general thickening of the uterine wall is present without any local tumour formation, the condition will be recognized as one of chronic metritis, and treated by hysterectomy or other means according to the merits of the case. Attempts to make a diagnosis by the use of the uterine sound or curette are not advised. Certainly much less dilatation is required to use the curette; but unless the sensible finger is used, small submucous growths may easily be overlooked by the curette.

If the bleeding is more irregular in character and the enlargement of the uterus slight, there are in addition carcinoma and abortion to be considered.

Carcinoma.—Carcinoma of the cervix ought to be recognized by the peculiar characteristics of the cervix.

Abortion.—Abortion, especially if occurring in patients who have suffered from chronic endometritis with irregular menstruation, may also give rise to errors in diagnosis, though the shorter history and the softer consistence of the uterus in most cases will suggest the cause of the hæmorrhage. The rare cases of missed abortion with the retention *in utero* of a firm carneous mole may give the enlarged uterus the harder feeling which is characteristic of fibromyoma. Here again the exploration of the interior of the uterus is the obvious treatment, and the finger will discover whether the bleeding is due to retained products of conception or a submucous fibroid, and in either case the removal of the offending mass can be proceeded with. It may be laid down as a sound working principle that, in any case of hæmorrhage in which the history and the presence of slight enlargement of the body suggest the possibility of a submucous fibroid, exploration of the cavity ought to precede treatment in order to make certain of the diagnosis.

With distinct symmetrical enlargement of the uterus, say to the size of a three months' pregnancy and over, the only question will be the differentiation from pregnancy with hæmorrhage due to threatened or incomplete abortion. A history of amenorrhœa preceding the hæmorrhage, the shorter duration of the symptoms, the softer feel of the uterus, with possibly a patulous cervix through which some portion of the ovum can be felt, ought to make the diagnosis clear. If there is any possibility of the case being one of threatened abortion, an expectant policy ought to be adopted. The patient should be kept at rest and under observation, and if the hæmorrhage ceases and the development of the uterus continues, it will be clear that the case is one of threatened abortion. If the hæmorrhage continues or the size of the uterus remains stationary, exploration of the cavity is clearly the means of deciding the diagnosis and indicating the proper treatment. A sloughing submucous fibroid with hæmorrhage, foul discharge, and some degree of toxæmia, may have to be differentiated from malignant disease, putrid retained products of conception, or chorion-epithelioma. Exploration of the uterus followed by examination, naked-eye and microscopic, of portions of the material removed is the only means of making certain of the condition present.

Fibromyomata forming a pelvic tumour may have to be differentiated from ovarian and other pelvic growths, rectal carcinoma, inflammatory masses in the pelvis, especially those of tubal origin, extra-uterine gestation, and pelvic hæmatocele. If they form an abdominal tumour, ovarian growths, pregnancy, inflammatory masses, and intra-abdominal growths, more particularly intestinal carcinomatous masses adherent to the uterus, are most likely to cause difficulty. A careful clinical history and thorough investigation of the physical signs will prevent error in all but unusual and obscure cases.

Ovarian Cysts.—Ovarian cysts are not usually accompanied by disturbances of menstruation, are generally elastic and fluctuating, and do not give the heavy, hard sensation which is characteristic of fibromyomata. The essential matter is to determine the relation of the tumour to the uterus and cervix, which is generally easier if the tumour is abdominal than if it is pelvic. It may be discovered separate and movable apart from the body and cervix, and the uterine canal not to be elongated. These physical signs would exclude all except a pedunculated subperitoneal fibroid. The rate of growth of these tumours is slow, whilst in ovarian cysts it is comparatively rapid. Therefore the length of history is an important guide to differentiation. Solid tumours of the ovary are as hard as a uterine fibromyoma, but are generally accompanied by a slight degree of ascites, a rare occurrence with subperitoneal fibroids. The differential diagnosis between these two conditions may be extremely difficult unless the complete separation of the tumour can be satisfactorily determined. Ovarian cysts, and among them dermoids are not uncommon, wedged in the posterior part of the pelvis, pushing the uterus upwards and forwards, may be a source of error, especially as the first symptom to draw attention to their presence may be retention of urine, which is the most frequent sign in impaction of a fibroid in the pelvis. In such cases the consistence of the swelling behind the uterus, the non-involvement of the uterus, which often can be made out independent of the tumour and of normal size, are the important signs.

Pelvic Hæmatocele.—A pelvic hæmatocele may give very similar physical signs and be accompanied by uterine hæmorrhage, and occasionally also by retention of urine. The history of a precedent amenorrhœa and attacks of pelvic and abdominal pain, perhaps with faintness and sickness; the recent and short history of menorrhagia, which is usually not severe; the occasional history of the passage of a uterine cast; the suprapubic tenderness and the doughy

feeling of the retro-uterine swelling, will serve to differentiate this condition.

Inflammatory Swellings.—Inflammatory swellings in the pelvis may be extremely hard and attached to the uterus, and so simulate fibromyomata. The history is here again of extreme importance. A septic abortion or puerperium or an attack of gonorrhœa may be found to be the origin of the trouble. Recurrent attacks of pelvic peritonitis with abdominal pain, fever, and general disturbance, are usual. Menorrhagia may be present, but, if so, is generally erratic in its occurrence and accompanied by dysmenorrhœa of the congestive type. The uterus is not enlarged, and its fixity and that of the mass adherent to it, and the tenderness on palpation, are all against simple new growth of the uterus. The diminution and softening of the mass and the disappearance of acute symptoms will confirm the inflammatory character of the swelling.

Inflammatory masses forming an abdominal or abdomino-pelvic swelling may simulate fibromyomata. Inflamed and adherent omentum, especially surrounding an intraperitoneal abscess about the uterus and appendages, may form a hard mass adherent to, and moving with, the uterus.

A careful clinical history is the chief safeguard against error, but the tumour may be noticed to be less well defined and more tender than would be expected in fibromyoma.

Abdominal and Pelvic Carcinoma.—Carcinoma in the pelvis or abdomen forming a hard mass which may be adherent to the uterus and move with it is a possible source of error. Usually there is a history of the passage of blood or mucus with the motions, or symptoms of obstruction if it is carcinoma of the bowel, or ascites is present if there are peritoneal masses. The rapidity of onset and growth, the severity of the symptoms in relation to the size of the growth, and the wasting and general constitutional disturbance, all point to something more serious than an innocent uterine tumour.

Pregnancy.—Pregnancy is more often confused with ovarian cysts than fibromyomata. Amenorrhœa is never caused by fibroids. Hæmorrhage during pregnancy is irregular, and the history will cover only a few months, instead of many, as is usual with fibromyomata. The pregnancy tumour is soft and elastic, and exhibits the distinct contractions of pregnancy. Fibromyomatous enlargement of the uterus is harder and more irregular; and though uterine contractions may occasionally be noted, they are infrequent and much less marked than in pregnancy. A uterine souffle may also be present, but it is much less distinct than in pregnancy. When

once the tumour has passed the mid-point between the pubes and umbilicus, ballottement and other signs of the presence of the fœtus ought to make error unlikely.

Pregnancy with Fibromyoma.—The diagnosis of fibroids with pregnancy may be much more difficult, especially if the presence of fibroids was previously unknown and the tumour is in front of the uterus. The chief points to be depended on for a diagnosis are that the uterine tumour will be larger than would be expected for the period of amenorrhœa; that it will vary in consistence, and perhaps be asymmetrical and nodular, and that it may be painful and tender to palpation from the secondary changes which frequently result from pregnancy. If the fibroids were known to be present, the rapid enlargement and softening of the uterine tumour due to pregnancy may suggest cystic degeneration, but the amenorrhœa and the mammary and other signs of pregnancy ought to make the diagnosis clear. The occurrence of a hydatidiform mole in a woman over forty-five may easily be confused with degeneration of a fibroid. The comparatively short history of bleeding ought to help in the differential diagnosis.

Prognosis.

Fibromyomata, being slow-growing tumours, as a rule make themselves felt only very gradually. Excepting submucous growths and fibroid polypi, they are usually present for years before the patient seeks advice. And, even after symptoms arise or the presence of an abdominal tumour has been recognized, long periods of quiescence may occur in which the patient's health and comfort are little disturbed. They are very rarely the immediate cause of death, though fatal cases have been recorded from hæmorrhage, intestinal obstruction, and peritonitis; septic intoxication from a sloughing submucous fibroid is perhaps the most frequent cause of death immediately due to a uterine fibroid. On the other hand, fibromyomata in the course of time tend to bring about some degree of general ill-health, so that the expectation of life is distinctly decreased, or, at any rate, enough invalidism is caused to make the patient less active, and to lead her to give up duties and exercises at an earlier age than she otherwise would. In other words, they make her older than her years.

Hæmorrhage severe enough to produce a fatal result has been stated to be exceedingly rare, but excessive menstrual loss over long periods leads to grave anæmia, and through it to cardiac degeneration and general nervous and physical weakness, with greatly diminished powers of resistance to any intercurrent infection or

disease. Incarceration in the pelvic cavity may lead to retention of urine, cystitis, and suppurative pyelo-nephritis; pressure on the ureters may produce hydronephrosis, atrophy of the kidney, or chronic interstitial nephritis. Fibromyomata—certainly those of the size of the full-time fœtal head and over—rarely atrophy, and commonly undergo some degree of degenerative change, with the possibility of the ill consequences already mentioned as resulting from this. The larger the tumour, the greater the liability to secondary changes and their sequelæ. The large tumours by their weight alone lead to considerable incapacity. Though pregnancy does not readily occur in a fibromyomatous uterus, should it do so many complications may arise—abortion or premature labour, ante- and post-partum hæmorrhage, obstruction to labour by tumours in the lower uterine segment, and sloughing or infection. The occurrence of sarcomatous change is so rare as not to influence the prognosis.

CHAPTER XLI

TUMOURS OF THE UTERUS—*Continued*

TREATMENT OF FIBROMYOMA.

Treatment.

The treatment of fibromyomata may be operative or non-operative. The general principles that influence the decision as to which of these two broad lines should be adopted must first be discussed, and afterwards the methods, operative and non-operative, and the cases to which they are specially applicable.

With regard to the first point, since a non-malignant tumour of slow growth and not of immediate danger to life is being dealt with, there is sure to be considerable divergence of opinion; for there will always be a school which will advise their patients to bear those ills they have rather than fly to others that they know not of, in the shape of surgical operations and post-operative complications. Indeed, this latter view was the generally accepted doctrine twenty-five or thirty years ago, when operation was not mooted till the woman's condition was such as to make life unbearable. At that time it was quite a reasonable position to take up, because the operation mortality was such that the risk was not worth running until all other possible means of alleviation had been exhausted. At the present time this risk is enormously diminished, and therefore, logically, surgical interference ought to be recommended so much the earlier. Furthermore, with improved results and consequent greater frequency of operation, as well as the lessened dread that comes of familiarity, there is a growing disinclination among patients to submit to a life of restricted activity when a means of escape involving little risk is open to them. At the present moment the tendency is rather to suggest removal of all except the smaller-sized tumours without symptoms, or in the case of patients in whom some factor is present to increase the risk of operation, or in whom the fear of it is so strong as to make them prefer to lead a less active life rather than face a surgical operation. It will be generally agreed that certain cases call for removal of the growths —for instance:

1. Fibromyomata causing hæmorrhage which necessitates the patient's lying up every month, and still more if it produces some

degree of secondary anæmia. Fibroid polypi and submucous fibroids are especially liable to cause symptoms calling for operation.

2. Fibromyomata undergoing degenerative changes causing pain and chronic ill-health, including sloughing and infected fibromyomata.

3. Tumours impacted in the pelvis and producing retention of urine, or tumours of the lower uterine segment obstructing delivery.

For the most part in these conditions the operation is one of necessity; but in addition there are many cases in which an operation, not strictly of necessity, but certainly of expediency, should be recommended, and justifiably so. Our knowledge of the life-history of these tumours, and what the future is likely to be if they are not removed, is a factor which must be considered. The patient's work and the kind of life she can, or is willing to, lead must be taken into account.

Marked divergence of opinion is likely to be found in cases in which, although there are no symptoms to make the operation one of necessity, it may yet be thought advisable to remove the tumour for the sake of the patient's future and to avoid incapacity. Some have gone so far as to say that every fibroid should be removed as soon as discovered, but this is clearly an extreme and untenable view. There can be no justification for the removal of small subperitoneal growths or atrophic tumours after the climacteric. Others have generalized by saying that fibromyomata giving rise to symptoms should be removed. This, however, is a worthless statement, for it is impossible to decide for certain what symptoms are due to the presence of the tumour and what are coincident. Pains and aches of all sorts and kinds in a neurotic woman, chronic indigestion, constipation, and even headache and lassitude, may be laid to its charge and serve as a reason for its removal; and yet post-operative neurasthenia and the persistence of the old troubles may cause the patient to sigh for her tumour again. All that can be said is that, in addition to the group of cases already mentioned, there may be added another category in which early operation ought to be suggested, even if there are no symptoms directly and indubitably attributable to the tumour. The size ought to be taken into consideration, and by itself is an indication for operation. A fibroid reaching halfway to the umbilicus or over, unless in an elderly patient at or past the climacteric, ought to be removed, unless there is some definite contra-indication. If the patient is a young woman further growth of the tumour is certain, and if more serious symptoms do not arise she will sooner or later suffer from incapacity in some way or another; her exercise and activity will be interfered with, and the probability is that, after enduring for some years the burden of her tumour,

she will wish to be rid of it, and thus have lost time she might otherwise have saved. If she is a middle-aged woman, and further growth of the tumour is likely to be trifling, it is still liable to increase in size from degenerative changes; and with a fibroid nearly the size of a five months' gestation, and still more if it is larger, the probability is that some form of degeneration will occur. If the tumour is largely pelvic, further increase in size, whether from active growth or degeneration, may cause pressure symptoms. So, with the life-history of fibromyomata in mind, such patients are better advised to have the tumour removed at once, and save themselves years of discomfort till the time comes when they feel it must be done if they are not to be crippled by it. In all borderline cases the best plan is to put the alternatives before the patient, and, without pressing immediate operation, let her wait till she sees whether she can live her life without grave discomfort. If not, or in the event of fresh complications arising, the removal of the tumour can be done when the patient herself has realized the need for it.

Operative Treatment.

In the case of single tumours, or even of a number provided the uterus is not too extensively involved, it may be possible to remove the fibroid by the operation of myomectomy, and leave the uterus. If the uterus is so extensively involved that a serviceable organ cannot be left, its removal is necessary (hysterectomy). Naturally, the conservative operation of myomectomy is to be preferred during the child-bearing period of life whenever possible.

Vaginal Myomectomy.—The simplest form of myomectomy would be illustrated by the excision of a fibroid polypus which had been extruded into the vagina. Here all that is necessary is to pull down the fibroid until a pair of scissors can be run along the pedicle, which is cut through. The retraction of the muscular fibre compresses the vessels and prevents bleeding.

If the case is one of a submucous fibroid becoming polypoid, such a one as mentioned on p. 310, dilatation of the cervix may be necessary till the finger can be admitted into the uterine cavity. By pressing down the body of the uterus on to the finger by a hand on the abdomen, it is generally possible to run the finger round the base of the tumour until it is detached or nearly so. If it is detached and not too large to pass through the dilated cervix, it is seized with vulsellum forceps and extracted. If it is not completely detached, its detachment will probably be completed by twisting it round and round while in the grasp of the forceps. If not, further separation with the finger will be necessary. If it is too large to pass through the cervix, it must be cut up by scissors into pieces which

will pass easily (morcellement). A sessile submucous fibroid—not only a small one discovered on exploration of the uterus, but even one large enough to cause an abdominal tumour up to the umbilicus—may be removed in a similar way by morcellation. In the case of tumours of the size of a hen's egg and over, dilatation of the cervix may not give sufficient room to work, and therefore it is best to make an incision through the vaginal reflection in front of the cervix, push up the bladder, and split the anterior lip (anterior hysterotomy). If the tissues at the base of the tumour are too resistant to allow the finger to get into the plane of separation, a few snicks with scissors curved on the flat will enable the finger to effect separation. If the tumour occupies so much room that it is not possible to separate it completely, the separated portions must be cut away by scissors, and enucleation of the remainder continued till the whole is removed. The retraction of the uterine muscle checks hæmorrhage from the bed of the tumour just as from the placental site, and if oozing is troublesome a hot douche or a firm intra-uterine plug will control it. This method of enucleation after dilatation, with incision of the cervix when necessary, is especially useful in the case of small submucous fibroids, not enlarging the uterus beyond the size of a three months' pregnancy. As soon as the enlargement of the uterus has reached a size sufficient to form an easily palpable tumour in the abdomen, and certainly if the tumour is nodular, suggesting the presence of multiple growths, an abdominal operation is to be preferred. The exact limits of enucleation and morcellation *per vaginam* cannot be defined, and depend on the individual judgment, preference, and experience, of the operator. It is more difficult and tedious than the simpler abdominal operation, and should not be attempted by the inexperienced for tumours larger than a golf-ball. In nulliparæ with a narrow vaginal outlet the removal of tumours of greater size than this might be troublesome. In multiparæ with a relaxed outlet, the operation can naturally be done with greater ease. The chief drawbacks to this operation are the possibility of other fibroids being present and not being submucous, and therefore not capable of enucleation *per vaginam*, and the risk of pushing the finger through the uterine wall into the peritoneal cavity during separation. In the first case, as the submucous tumours would be the cause of the hæmorrhage, and the others small and unimportant, they could be left without fear of causing symptoms for many years; but another operation is a possibility which must always be put before the patient. In the event of perforation of the uterus, no harm is likely to result if the tear is small and the operation a clean one. Irrigation of the cavity should not be done, but if there is hæmorrhage a wisp of gauze

should be passed into the opening and the uterine cavity plugged also. If the opening is large or the tumour infected, vaginal hysterectomy should be done at once. Such perforation is a rare accident, and the possibility of its occurrence should not cause any hesitation in the selection of this method in cases otherwise suitable. Enucleation is not only the method of election with small submucous fibroids, but it is to be preferred when possible in cases of large sloughing growths with foul discharge, in which abdominal hysterectomy becomes dangerous from the risk of peritoneal infection. Such tumours usually protrude through a widely dilated cervix, and are easily cut up, whilst the base is often firm and unaffected, so that their separation is not difficult. They are also generally single. Cervical fibromyomata, interstitial or the rarer and smaller submucous variety, when projecting towards the vagina, are also preferably enucleated by this route. An incision is made over the stretched-out portion of the cervix, which forms the capsule until the finger can be insinuated along the line of separation. Morcellement is necessary in all but very small tumours, and hæmorrhage may be more severe than in the case of corporeal growths, as the power of retraction is not so well marked in the cervical musculature. A hot douche and firm plugging will control the bleeding in most cases; should this not suffice, buried catgut sutures will be effective.

Abdominal Myomectomy.—This should be preferred in all cases in which the tumour cannot be determined on vaginal examination to be definitely submucous and capable of enucleation from below. The abdominal incision allows of a thorough examination of the uterine tumour, and thus a full consideration as to whether myomectomy or hysterectomy is better. Myomectomy is naturally to be preferred as the conservative operation so long as the uterus may be called upon to perform its function of carrying the ovum. In a young woman every effort should be made to preserve the uterus; in a woman nearing the climacteric, and especially if, after bearing children, she has not been pregnant for many years, hysterectomy should be preferred, unless in the case of a single well-pedunculated subperitoneal growth, when division and suture of the pedicle is all that is required. Pedunculated subperitoneal fibroids are those most clearly suited for myomectomy.

Myomectomy may be done in cases of multiple growths if their removal does not entail too much damage to the uterus; but the cases of this kind in which it is worth while trying to save the uterus are not frequent, and it must be remembered that myomectomy has a slightly higher mortality-rate than hysterectomy owing to the greater risk of hæmorrhage. They are generally cases of one large tumour and a few small nodules, and in them there is always the

chance that in years to come a further operation may be called for. If the uterine cornua happen to be involved by the growth, so that the tubal insertions are damaged or involved in the suturing, the chances of pregnancy are greatly diminished, and attempts to preserve the uterus are scarcely worth persisting in. It is remarkable, however, how the uterus will recover after very extensive enucleations, and function perfectly normally throughout pregnancy and labour, and therefore in properly selected cases the conservative operation ought to be selected.

Curetting.—This is done sometimes as a palliative measure. It is uncertain, and not free from risk, as injury to, and infection of, the tumours may result; and its effect is very temporary. It is generally acknowledged to be bad practice.

Hysterectomy may be either vaginal or abdominal. As a rule vaginal hysterectomy is suitable only with small uteri under the size of a three months' pregnancy, and in multiparæ. Operators specially skilled in vaginal surgery may succeed in selected cases in removing by the vaginal route tumours reaching up to the umbilicus; but this usually involves division of the uterus and morcellation, and is not generally adopted.

Abdominal hysterectomy, partial or complete, is the most frequent operation for tumours above the size of a tangerine orange, abdominal or pelvic, and not submucous. It has the great advantage of insuring no further trouble from recurrent growths. It is the operation of choice in all cases not specially mentioned under the preceding measures. When possible both ovaries, or one if that is not possible, ought to be left to obviate the sudden onset of climacteric symptoms.

Fibromyoma complicating Pregnancy.—This calls for special consideration. The golden rule in such cases is, never to interfere unless urgent symptoms necessitate it, and, when compelled to interfere, to adopt as conservative a method as circumstances permit.

It is most important to realize that in the vast majority of cases pregnancy will go to term, and labour occur naturally, in spite of the presence of fibroids in the uterus. No medical adviser should presume to condemn a fibromyomatous pregnant uterus; it is quite remarkable what it can do handicapped as it is, and ignorance or impatience are the only reasons for interference without very distinct indications. Abortion is somewhat more liable to occur in such cases, but it is best to wait and see if it does, and decide on the treatment to be adopted when it has occurred. If acute degenerative change with pain severe enough to call for operation should arise, myomectomy should be attempted if possible. A considerable

proportion of cases will go to term, even after an extensive operation on the uterus, and no complication in labour need be expected. Subperitoneal fibromyomata may cause pain for a few days after labour, so as to suggest degeneration, but the symptoms often disappear with rest in bed and hot applications.

When the patient is nearing term, a careful investigation should be made, to decide on the treatment to be adopted. Unless the mass of fibroids is below the fœtus, so as to obstruct the pelvis, the patient should be left to deliver herself *per vias naturales*, and the treatment of the tumours considered after the lying-in time is over. Should it be clear that the tumour will require removal sooner or later, although it will not interfere with labour, the simplest treatment would be Cæsarean section at term followed by enucleation of the tumour. If the fibromyomata form a pelvic mass which will obstruct delivery, Cæsarean section should be performed at or about term, and myomectomy or hysterectomy as may be indicated. Such operations at the end of pregnancy, so far from being rendered more difficult, are often made easier because of the amount of loose cellular tissue present simplifying separation. The danger of secondary changes in large tumours as the result of pregnancy, labour and the puerperium must be taken into consideration before deciding to postpone removal to a later date.

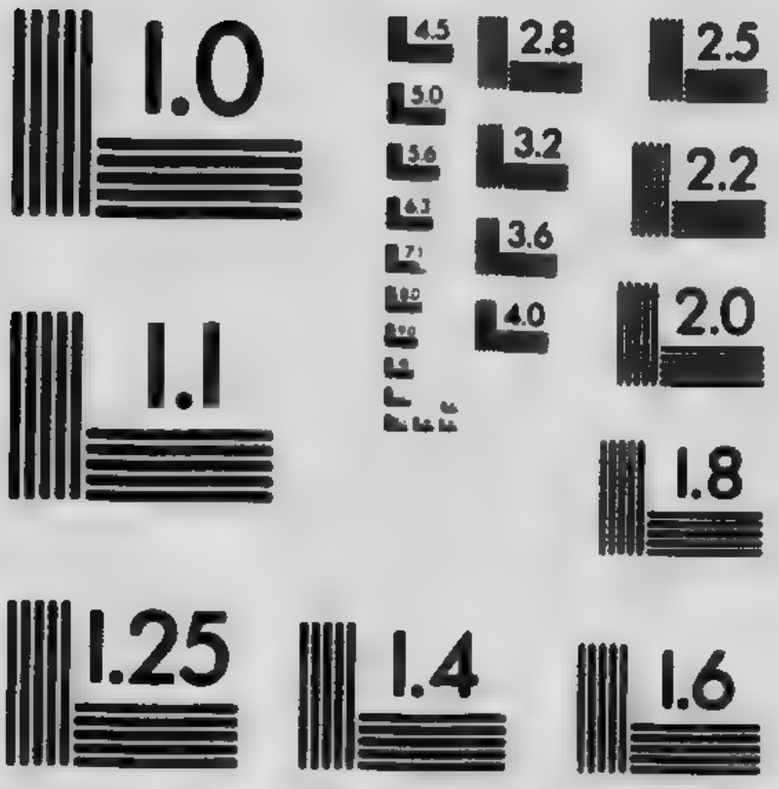
Palliative Treatment.

It is necessary in cases in which the tumours are causing decided ill health and incapacity, and the patient is unwilling to submit to operation, or if some consideration, such as renal or cardiac disease, forms a bar to surgical interference. In cases of growths not causing any trouble, no treatment is required. The patient should be kept under observation, or should be told to report herself if troublesome symptoms develop.

In cases in which operation is refused or contra-indicated, treatment by X-rays, radium, and electricity, may be tried. During the last few years considerable success has attended X-ray treatment. It is most satisfactory in checking menorrhagia, and therefore has most chance of success in cases in which this is the prominent symptom. It appears to act by causing atrophy of the ovaries and hastening the climacteric, and by causing cessation of active growth, and even some absorption of the tumour. It is uncertain in its results, and requires prolonged and skilful application, but much more may be expected from it with further experience in the selection of cases and the method of application, though it can never appear scientific to destroy healthy ovaries in order to treat a diseased uterus. Burns of the abdominal wall, causing trouble-

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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some and slow-healing ulceration, are readily produced, and form a further objection to this mode of treatment. Insufficient experience also prevents any definite statement in regard to results from radium, but it is probably not so successful as X-rays in relieving symptoms. Fifty to two hundred milligrammes in a suitable filter may be left in the cavity of the uterus for twenty-four to thirty-six hours, and the application repeated two or three times at intervals of a month or more. Cross-radiation from a tube on the abdomen may be tried at the same time.

Electricity has not proved successful except in occasional cases, and is not worth a trial if X-ray and radium treatment, which have a greater chance of success, fail.

Rest is very important in bleeding fibroids, and, in those cases in which the size and weight of the tumour is felt, the patient must needs adopt a quiet life and reconcile herself to a gradually diminishing activity. Drugs are very disappointing and very uncertain. Ergot (℥i. doses of the liquid extract) occasionally may do good, and is sometimes useful in hastening pedunculation of a submucous fibroid, so that it becomes easily removable as a polypus. Calcium lactate (℈ss. doses every other day) may be given in the intervals and the ergot reserved for the menstrual periods. Sedative drugs, especially potassium bromide and the cotarnine salts, with rest in the recumbent position, may do good when ergot fails, and are useful when the patient is hopefully awaiting a delayed menopause.

Should a severe flooding occur, hot douches, plugging the uterus and vagina, ergot and the hypodermic injection of adrenalin (♏ xx. of 1 in 1,000 solution) or pituitrin (1 c.c.) may be adopted as a temporary measure.

ADENOMYOMA OF THE UTERUS.

Pathology.

This is a curious growth of a diffuse nature, composed of gland-tubules exactly like those of the endometrium, surrounded by a certain amount of cellular stroma, and enclosed in bundles of smooth muscle and fibrous tissue. To the naked eye, on section of a uterus thus affected, the growth can be seen to be composed of whorls and bundles very like a fibromyoma; it is, however, continuous with the endometrium and bulges the uterine muscle over its somewhat irregular outline. Sometimes it projects more on one side than on the other, but in every case the growth is not encapsulated and is thus clearly distinguished from a fibromyoma.

Microscopically the smooth muscle bundles and fibrous tissue are the same as those in a fibromyoma, but they are seen to enclose gland-tubules, exactly like those of the endometrium which are lined

by short columnar epithelium. Furthermore, these tubules are surrounded by a varying amount of cellular stroma, also exactly the same as that of the endometrium. The gland-tubules are often dilated and form minute cysts, usually containing a clear fluid, but not at all infrequently these small spaces contain blood, suggesting that the tubules in the growth take part in menstruation, like those in the endometrium. Adenomyomata are found most commonly in the body of the uterus and rarely in the connective tissue at the back of the cervix, in the recto-vaginal septum and in the groin along the round ligament. When occurring in the recto-vaginal septum, the growth may involve the muscle coats of the rectum. There can be no doubt that these tumours arise directly from the endometrium itself. In most cases of diffuse adenomyoma, the gland-tubules can be traced from the endometrium into the growth, and it is believed that an adenomyoma in the recto-vaginal septum has a similar origin, but has lost its connection with the endometrium at an early stage.

No adequate explanation has been suggested for these tumours when they occur in the groin; possibly they may arise from displaced Müllerian remnants. It is not known how the smooth muscle and fibrous tissue stroma become associated with the gland-tubules, but there is no doubt that this stroma forms the bulk of the growths. It seems likely that the tubular ingrowths are primary and that the smooth muscle stroma is a secondary production.

Although adenomyomata are not encapsulated, they are not malignant; they do not infiltrate the tissues as a malignant growth does, and they never produce metastases.

Symptoms and Signs.

These are the same as those of fibromyomata. Menorrhagia is often very severe and is not infrequently accompanied by metrorrhagia as well. The size of the uterus is seldom larger than that of a three-month pregnant uterus.

Diagnosis.

Adenomyomata are usually diagnosed as submucous fibromyomata before removal, and can only be distinguished by the microscope.

Treatment.

The growth should be removed by hysterectomy. When it occurs in situations other than the uterus the question of its removal depends upon the gravity of the symptoms. As these tumours grow slowly and are not malignant, they may be left alone as long as they produce no important symptoms. In the recto-vaginal septum their removal is often troublesome, and considerable danger of injuring the rectum has to be faced.

CHAPTER XLII

TUMOURS OF THE UTERUS—*Continued*

UTERINE POLYPI.

A PEDUNCULATED tumour or polypus may arise from the mucous membrane or the muscular wall of the uterus. Adenomatous or mucous polypi originate either from the cervical or corporeal mucosa, and as the cervical mucous polypus is one of the commonest uterine new growths, it will be considered first.

Mucous Polypus of the Cervix.—This is a red, soft growth, rarely exceeding the size of a cherry, arising from the mucosa of the cervical canal, and usually protruding through the os. It is almost gelatinous in consistence, and on section thick glairy mucus may escape from the dilated gland spaces which generally form a considerable portion of its structure. Microscopically it is composed of cervical glandular tissue with interglandular connective tissue which may show considerable small-celled infiltration. Many of the glands form cavities lined with cylindrical or cubical epithelium and filled with thick mucus, so as to be exactly like the distended follicles known as Nabothian follicles (p. 204). Indeed, the simplest type of this tumour may be said to be a Nabothian follicle which has become extruded and pedunculated together with a certain amount of the surrounding mucosa which has undergone proliferation. The surface, especially if the growth has originated near the external os or if it has been some time in the vagina, may be covered with squamous epithelium: otherwise it is covered by columnar epithelium (see Fig. 83).

These polypi are very often multiple, and usually occur either as part of chronic cervical catarrh, very often with laceration, ectropion, and erosion, or as part of a post-climacteric atrophic change. It is not unusual to find with these pedunculated mucous growths many other similar conditions. Thus, Nabothian follicles, small cysts of the cervix, and erosion on the vaginal surface, are frequent accompaniments. Their occurrence in such circumstances points to their being due to a chronic inflammatory process with blockage of the gland-tubules and glandular proliferation, and

this is further borne out by the small-celled infiltration and cellular character of their connective-tissue elements. In this, their origin is precisely similar to nasal and other polypi of the mucous canals. The whole cervical mucosa may be protuberant and of a diffuse "polypoid" appearance, but more often these polypi are purely local. They may form almost sessile growths, or the pedicle may be drawn out to such a degree as to allow the tumour to protrude at the vulva, when the patient is in the erect position, though this elongation is more often found in the fibro-adenomatous type.

FIG. 112.—FIBROID POLYPUS IN THE CAVITY OF THE UTERUS.

The posterior wall of the uterus has been opened, showing a pedunculated submucous fibroid attached to the fundus. To the left of it is a small mucous polypus. The uterine wall is hypertrophied and the cavity dilated; the cervical canal has been taken up and the os is sufficiently dilated to admit two fingers. The next stage would be the extrusion of the polypus through the dilated os into the vagina.

When well pedunculated and large, they are liable to slough from interference with the blood-supply, injury, and infection. A natural cure of individual growths may result from their sloughing away.

SYMPTOMS.

The chief symptom of cervical mucous polypi is the same as that of chronic cervical catarrh—viz., leucorrhœa, which may be slightly blood-stained either from injury to the growth itself or to the accompanying erosion or hyperæmic and exposed cervical mucosa. The

discharge is generally thick and glairy—often described as like "white of egg"—and may be profuse enough to give rise to pruritus vulvæ. It is generally inoffensive, but may become offensive from superficial necrosis of the polypus or from putrefactive changes in the discharge itself. Menorrhagia and metrorrhagia may be present from coincident endometrial changes, but cannot strictly be ascribed to the polypus itself. Very often the symptoms are trifling, and the existence of the polypi may only be discovered by chance. Occasionally a patient will complain solely of something protruding at the vulva.

Signs and Diagnosis.

The diagnosis is generally easy. The polypus can be felt in the cervical canal or protruding at the os as a soft velvety substance, and with the speculum can be seen as a red projection from the cervical mucosa or a protrusion through the os. Slight hæmorrhage may occur on examination, more profuse if there is coincident erosion of the cervix, but not to the degree associated with carcinoma. The error that is most frequently made is not that of mistaking the nature of the polypus, but of overlooking some other more serious condition which is present at the same time, such as carcinoma, and accepting a mucous polypus as a full explanation for symptoms which really arise from another and graver disease. Hence a sound working rule in all cases in which the symptoms are more than those of a simple cervical catarrh with occasional streaking of the discharge with blood is to examine thoroughly both the cervix and the cavity of the uterus.

Prognosis.

The prognosis is good in uncomplicated mucous polypi; they are liable to recur, especially if the condition provoking them—laceration, eversion with chronic cervical catarrh—is allowed to persist. In the event of recurrence or of the presence of more serious symptoms than is usual, microscopic examination of the polypus and of any other suspicious uterine tissue should be made.

Treatment.

These polypi are best removed by twisting the pedicle. They are seized with ovum or ring forceps, or the pedicle clamped by artery forceps, and twisted until they come away. In this way hæmorrhage from vessels in the pedicle is avoided.

If there is insufficient pedunculation for removal by torsion, a sharp curette will best effect their removal. It is a sound plan in

all cases in which there is eversion and catarrh of the cervix to scrape the whole cervical mucous surface and treat it with phenol, saturated copper sulphate solution, or other caustic agent. The question of repair or amputation of the cervix must be decided by the conditions present.

Mucous Polypus of the Endometrium.—This is much less common than the cervical polypus, and pathologically is indistinguishable from the diffuse hyperplasia of the endometrium, often termed "glandular endometritis" (p. 214). It is merely a local hyperplasia of the endometrium, which has formed a tongue-like process hanging into the uterine cavity as a polypus, and is found most frequently in the neighbourhood of the uterine cornua. There may be numbers of these polypoid masses, so that the whole endometrium is covered with them, forming so marked a degree of endometritis that the term "polypoid endometritis" has been used to describe the condition. Not infrequently during the operation of curetting one or more of these adenomatous polypi may be removed, and, again, on examining the uterine cavity of fibromyomatous uteri removed by hysterectomy, such polypi may be found in addition to a general endometrial overgrowth. This means that these adenomata have no special importance apart from the general condition of the endometrium. They are much paler than the corresponding cervical polypi, have not so well defined a pedicle, and very rarely reach such a size as to protrude through the cervix. Microscopically they exhibit the same structure as hypertrophic glandular endometritis—*i.e.*, marked overgrowth of the glandular elements (see Fig. 87).

Symptoms.

The symptoms are uterine hæmorrhage—usually menorrhagic in character—with sometimes discharge of a watery nature. They are the same as those in diffuse glandular endometritis, and reference can be made to p. 214 for a fuller account of the symptoms.

Diagnosis.

The diagnosis, as the polypi are nearly always intra-uterine, can only be made by exploration of the uterine cavity or by finding the polypi after curetting. There may be slight enlargement of the body.

Treatment.

The treatment is curetting or removal by ring forceps.

Fibro-Adenomatous Polypi bear much the same relation to the adenomatous polypi that an "interstitial" does to a "glandular" endometritis (*q.v.*). There is a considerable new formation of fibrous tissue, and sometimes also of muscle tissue (fibro-adenomyomatous polypi) as well as of the glandular elements; but as a rule the fibrous element predominates. These tumours are firmer, larger, and more solid to the feel, than the pure adenomata, but otherwise are very similar in appearance. They are much commoner in the cervix than in the body; they contain the same cystic spaces formed from dilated glands containing thick glairy mucus, are generally well pedunculated, and more often protrude at the vulva, and therefore are more liable to superficial necrosis than the smaller adenomatous polypi. Sometimes pits are formed on the surface, and even channels through the tumour may be found as the result of hypertrophy and dilatation of the glands.

Diagnosis.

The diagnosis from the simple adenoma can only be made with certainty by histological examination, but the characteristics mentioned above will usually serve to distinguish them.

Symptoms and Treatment.

The symptoms and treatment are the same as for mucous polypi. When wholly intra-uterine, dilatation and exploration of the uterine cavity is necessary for their detection; when discovered, they may be removed by torsion

Fibroid Polypi are submucous fibroids which have become pedunculated by extrusion of the growth from its uterine bed, and have already been referred to under Fibromyomata (p. 311). They grow from the body of the uterus, and at first form intra-uterine growths; but as the result of the uterine contractions which endeavour to expel them as a foreign body, the cervix is dilated and the tumour extruded into the vagina. They are the most important class of uterine polypi (Figs. 112, 113, 114, 115).

Nothing further need be said about their structure, which is fully described under Fibromyomata. The one point which is worthy of mention is that after extrusion into the vagina a metaplasia of the covering mucosa may result in the growth being covered with a layer of stratified epithelium.

They form much larger tumours than the adenomatous polypi, and may reach the size of a fœtal head and completely fill the vagina. The usual size is about that of a pigeon's or bantam's egg. Other fibromyomata are frequently to be found in the uterus, and after

removal recurrence is frequent, from subsequent extru- of other submucous tumours.

As the result of their extrusion, the pedicle becomes elongated and thinned, so that the blood-supply may become insufficient for their nutrition. This, together with the fact that they are specially liable to injury and infection, results in necrosis and sloughing of the surface, and sometimes of the whole tumour. It may thus be got rid of naturally by attenuation of the pedicle and sloughing, but more commonly the occurrence of an extremely fetid discharge

1 2

FIGS. 113 AND 114.—DIAGRAM OF SUBMUCOUS FIBROID BECOMING EXTRUDED AS A FIBROID POLYPUS.

1, Sessile s[ub]- [fi]broid projecting into the uterine cavity from the posterior wall n[ear] [fu]ndus.

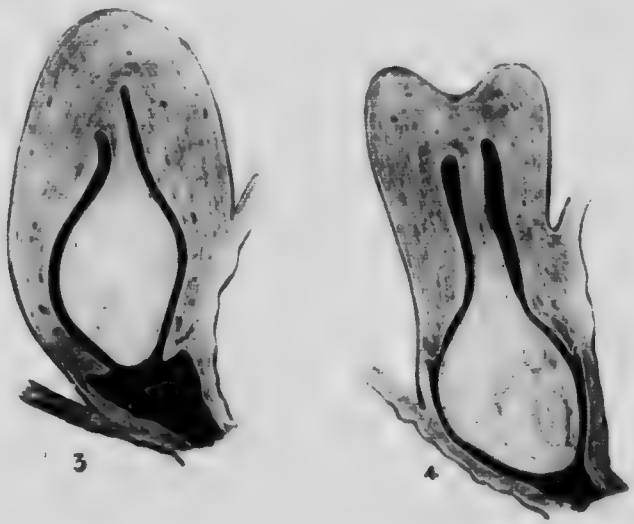
2, Further [de]velopment. The upper part of the uterine cavity is dilated, and th[e tu]mour has been extruded from the uterine wall to which it is attached by a sho[rt] pedicle.

calls for immediate operation. Another consequence of extrusion, in cases in which the pedicle has a fundal attachment, is inversion of the uterus. This polypus is the most usual cause of chronic uterine inversion (Figs. 116, 117).

SYMPTOMS.

To begin with the symptoms will be those of a submucous fibroid—menorrhagia and leucorrhœa—but with pedunculation and extrusion there is more severe and irregular bleeding, and pains like mimic labour pains. The hæmorrhage comes from the endo-

metrium, not from the polypus itself. The most marked degree of anæmia seen in patients suffering from fibromyomata is generally due to growths of this kind, and it is surprising how seriously a patient may suffer from quite a small tumour, say only the size of a walnut. If sloughing and putrefaction occurs, the discharge becomes extremely offensive, and toxic symptoms may be added to those due to the anæmia.



FIGS. 115 AND 116.—DIAGRAM OF SUBMUCOUS FIBROID BECOMING EXTRUDED AS A FIBROID POLYPUS.

3, The polypus has distended the uterine cavity; the cervix is dilated so that the lower pole projects through the external os. The uterine wall is markedly hypertrophied and the pedicle of the tumour is slightly elongated.

4, The polypus has now been extruded and lies partly in the dilated cervical canal, but mainly in the dilated vagina. Its pedicle is markedly elongated, and by dragging in the upper part of the uterus has produced slight cupping of the fundus—*i.e.*, commencing inversion.

DIAGNOSIS.

An intra-uterine fibroid polypus gives precisely the same symptoms as a submucous fibroid. Erratic and severe hæmorrhage together with the occurrence of mimic labour pains would suggest commencing pedunculation, and, if the finger is pressed into the cervical canal, it may be sufficiently patulous to yield so as to allow the lower pole of the tumour to be felt. The polypus may already occupy the cervix, which will be found shortened and expanded; the external os will then generally admit the finger-

tip to touch the tumour. When once the polypus has been wholly or partially extruded, diagnosis is easy. A hard growth surrounded by the dilated cervical lips or a rounded mass in the vagina is felt, the pedicle of which can be traced up through the cervix into the uterus. If it is sloughing, the surface will be soft and break away readily under the finger, and the discharge will be fœtid. In the case of large tumours filling up the vagina, especially if gangrenous, the distinction from fungating cervical carcinoma may not be easy. The size of the tumour may make it difficult to decide that it comes through, and not from, the cervix, and the symptoms and the cachexia may be suggestive of carcinoma. Examination under anæsthesia, so as to permit of the finger being passed above the growth to explore its relations to the cervix and uterus, and microscopic examination of non-necrotic portions of the tumour removed for the purpose, will decide the diagnosis. Careful bimanual examination, if necessary under anæsthesia, revealing the uterine body above the tumour, and the passage of the finger or the sound into the uterine cavity, will distinguish a fibroid polypus from chronic uterine inversion, the only other condition likely to give rise to error in diagnosis. If there is difficulty in making a bimanual examination *per vaginam*, a rectal bimanual will generally reveal the absence or presence of the body of the uterus above the tumour. The inverted uterus also is tender, which is not the case with a fibroid polypus.

Treatment.

Removal of the polypus by cutting through the pedicle with scissors curved on the flat is indicated as soon as a diagnosis is made. Should extrusion not be complete, the case must be treated by dilatation, as with a submucous fibroid, until the tumour can be brought down and the pedicle divided. If the pedicle cannot be reached, the tumour must be cut up first. Hæmorrhage does not occur from the divided pedicle, as bleeding is controlled by the retraction of its muscular fibres. A hot intra-uterine douche and plugging of the uterus will check any hæmorrhage not controlled in this way. Care should be taken, before dividing the pedicle, to make sure that partial inversion has not occurred, otherwise the peritoneal cavity may be opened. After removal, it is as well to curette the uterus, as bleeding may continue from the thickened and inflamed endometrium.

Malignant Polypi and Polypoid Masses may present at the cervix in cases of carcinoma of the cervical canal and of the body of the uterus. Sometimes a sarcomatous polypus may be extruded into

the vagina in a case of sarcoma of the cervix uteri. In young children the rare "grape-like" sarcoma of the cervix forms a multitude of polypi which is not likely to be confused with any of the ordinary simple uterine polypi.

In all cases of doubt the microscope must decide as to the nature of the growth, and in any case in which the symptoms and clinical history, the naked-eye appearance of the tumour, or its recurrence after removal, in any way suggest the possibility of malignancy, such examination should not be omitted.

Placental or Fibrinous Polypi, consisting of a core of chorionic tissue covered with layers of fibrinous blood-clot, may be extruded after a full-time labour or an incomplete abortion. Putrefactive changes may occur in these false polypi and simulate a sloughing fibroid polypus. The clinical history and the brittle nature of the extruded mass will usually decide the diagnosis, but in any doubtful case examination by the microscope will reveal chorionic or decidual products in the centre of the mass. The treatment is as for incomplete abortion.

CHAPTER XLIII

TUMOURS OF THE UTERUS—*Continued*

CARCINOMA OF THE UTERUS.

It appears from the official records of the Middlesex Hospital Cancer Charity that between the years 1855 and 1901 there were 5,359 women admitted suffering from cancer; of these 2,320, or 43·2 per cent., were suffering from cancer of the genital organs, 2,165 of whom, or 40·9 per cent., had cancer of the uterus. A further study of these statistics shows that the uterus is by far the commonest seat of cancer in the female.

Cause.

The cause of cancer of the uterus is not known. It has been thought that heredity may play a part in the incidence of the disease, but a study of the Middlesex Hospital statistics tends to show that, if anything, the opposite obtains.

Cancer of the uterus is relatively commoner among the poor than the well-to-do, which suggests that poverty, distress, and neglect, may be contributory factors.

That age has some bearing on the subject under discussion is apparent from the fact that the liability of a woman to acquire cancer of the uterus increases up to the age of forty-eight, a time when the uterus is no longer of any use and is practically a dying organ.

Lastly, it is very probable that child-bearing is an important contributory factor, for, according to the statistics already quoted, 92·3 per cent. of the patients suffering from cancer of the cervix, and 75 per cent. of those with cancer of the body, had had one or more children.

This striking preponderance of fertile over sterile women is probably connected with the injuries and chronic inflammation resulting from childbirth, especially laceration of the cervix and erosion. Moreover, in connection with this point, it is a fact that the degree of parity is greater in those women who acquire cancer of the uterus than in those who remain free, the figures being—for

cancer of the cervix, 5·23 of full-time children and 1·9 of miscarriages, and for cancer of the body 4·58 and 1·66, respectively. Cancer of the uterus occurs much more frequently in the cervix than in the body; thus, in the Middlesex Hospital statistics 97 per cent. of the cases were cervical.

CARCINOMA OF THE CERVIX.

Carcinoma of the cervix accounts for nearly 40 per cent. of all cases of cancer in the female, and for over 90 per cent. of all cases of malignant disease of the female genitalia.

It is twenty times commoner in married than in single women, and, as in the general population the proportion of married to single women is 5 to 1, this fact has an important significance.

The average age for carcinoma of the cervix to appear is 44·63, and in the Middlesex series the youngest patient was 22 years of age, and the oldest 86·5. In 51 per cent. of the patients the disease commenced with or before the menopause.

Varieties.

Carcinoma may arise in the squamous epithelium of the portio vaginalis (extracervical carcinoma), or in that portion which lines the cervical canal and cervical glands (intracervical carcinoma). The former variety is the commoner.

Symptoms.

The classical symptoms due to the growth itself are those of hæmorrhage, discharge, and, later, pain, cachexia, and vasting. Other symptoms may be present, due to involvement of the bladder, rectum, vagina, and ureter.

Hæmorrhage.—In nearly every case the earliest and most important symptom is bleeding. At first this bleeding is only slight and irregular; it may occur without any apparent cause, or follow coitus, the insertion of a vaginal douche-nozzle, or some undue straining.

The fact that in a large number of cases the bleeding is first discovered after coitus is an important fact in the "history." Later, when the growth has ulcerated into some branch of the uterine artery, serious and continuous bleeding may ensue, which at times is even fatal. Menstruation itself is not directly affected by a growth of the cervix. In some cases there is a septic endometritis; in others the congestion of the cervix accompanying menstruation induces an increased oozing from the growth.

Discharge.—The discharge is at first small in quantity, leucorrhœal in character, and inoffensive in odour, and at times it is brownish in colour from the admixture of blood. When ulceration has taken place and the growth has become infected, the amount of discharge is increased: it is described by the patient as resembling dirty water in appearance, and is horribly offensive, and so irritating that pruritus and vulval soreness are a further addition to the sufferings of the patient. In the last stages the absorption of the toxic products of the discharge may induce general sepsis with fever and other accompanying symptoms.

Pain.—The pain associated with cancer of the cervix is due to the extension of the growth into the cellular tissue, on to the vagina, and into the body of the uterus: it is therefore comparatively late in its appearance. The pain, which is generally worse at night, is of a dull aching character, and is felt principally in the sacrum and thighs.

Cachexia and Wasting.- The general symptoms of cachexia and wasting are quite late in making their appearance. They are due to the anæmia resulting from the loss of blood, to the toxic absorption from the putrefying growth, to the loss of appetite and inability to take sufficient nourishment, and to the want of sleep and rest occasioned by the pain.

Symptoms due to Involvement of the Vagina, Bladder, Rectum, and Ureters.—If the growth extends into the anterior vaginal wall it may involve the urethra, causing at first painful micturition, and in the later stages perhaps even complete retention of urine. If the growth extends anteriorly through the cervix, or on to the anterior vaginal wall, the bladder becomes affected, resulting in cystitis, and later in a vesico-vaginal fistula, the constant dribbling of the irritating urine occasioned thereby adding to the misery of the patient. If the growth extends for some distance down the posterior vaginal wall, a recto-vaginal fistula may result, or it may cause constipation, painful defæcation, hæmorrhage from the rectum, and very rarely complete obstruction. Extension of the growth laterally in an appreciable number of cases involves the ureters, with the result that the patient suffers from constant headache, nausea, sickness, and other symptoms pointing to uræmia, due to the decreased renal elimination. Hydronephrosis may develop.

Signs.

The signs of carcinoma of the cervix depend upon the nature of the growth and the length of time it has been present.

Extracervical Carcinoma.—Extracervical carcinoma commences in the stratified epithelium covering the vaginal portion of the cervix, as a dark red somewhat indurated patch. This patch is often in the neighbourhood of the external os, and at this stage it may be mistaken for an erosion.

The squamous-celled carcinoma either spreads upwards into the cervical tissue, forming eventually a deep ulcer, or downwards into the vagina as an ulcerating warty growth, which in some cases has somewhat the appearance of the floral surface of a cauliflower. Pieces of the growth can easily be detached with the finger-nail, finger, or forceps (that is to say, it is friable), with the result

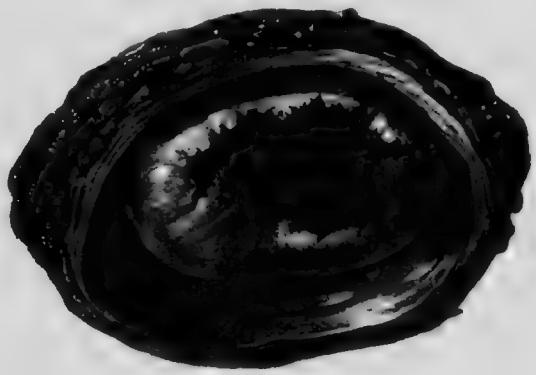


Fig. 117.—Carcinoma of the Cervix: Extracervical, showing deep Ulceration.

Similar type to Fig. 124, but seen from below instead of on section.

that hæmorrhage occurs, or, if present, is increased in quantity. According to the age of the growth, a bimanual examination may disclose that the uterus is fixed either by extension of the growth or by an inflammatory reaction in the cellular tissue round the uterus. A rectal examination may show that the utero-sacral ligaments are similarly affected (Figs. 117, 118).

In early cases, on exposing with the vaginal speculum that portion of the cervix implicated by the growth, it is seen to be duller in appearance and darker in colour than the rest, and minute hæmorrhages may be seen in its substance. The suspected area bleeds very easily on being touched, and the point of the uterine sound can be made to perforate it readily for some little distance.

In advanced cases of the proliferating type of cervical carcinoma, the vagina may be entirely filled with the growth. With squamous-

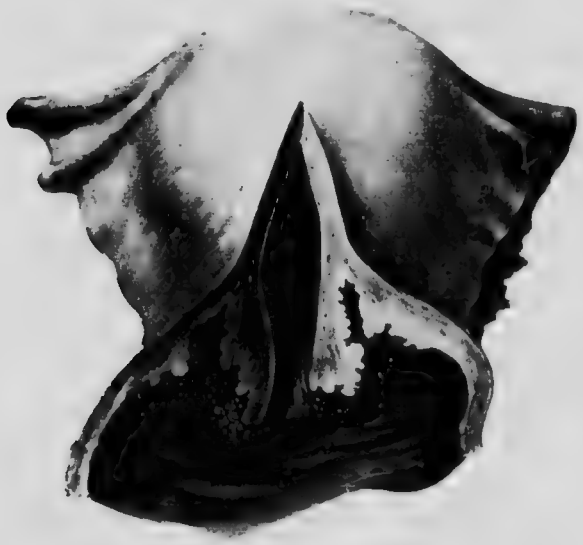


FIG. 118.—CARCINOMA OF THE CERVIX: EXTRACERVICAL; PAPILLOMATOUS IN TYPE, SPREADING TO VAGINA.

More necrosis than new growth.

FIG. 119.—CARCINOMA OF THE CERVIX: EXTRACERVICAL, SQUAMOUS-CELLED.

Proliferating type, filling vagina; growing from posterior lip; anterior lip cut away

celled carcinoma there is always new growth and necrosis. If the new growth is marked and the necrosis small in amount, a fungating type results; on the other hand, if the necrosis is in excess, then clinically the growth presents as a cavity (Fig. 119).

Intracervical Carcinoma.—Columnar carcinoma of the cervix commences as a rule high up in the epithelium lining the cervical glands or canal, and does not ulcerate so quickly as the extracervical

FIG. 120.—CARCINOMA OF THE CERVIX: INTRACERVICAL, SPREADING UP TO THE BODY OF THE UTERUS.

The uterine cavity was distended with pus—pyometra. Note that the vaginal portion of the cervix is unaffected.

variety. The growth rather tends to spread outwards in all directions, with the result that bimanually the infiltrated supravaginal cervix feels markedly enlarged and very hard. Later the growth ulcerates through the vaginal portion of the cervix, and a large excavated cavity is revealed. Ulceration, however, may up to the time of examination have stopped short of the external os, and it

is only when the cervix is being dilated for diagnostic purposes that this excavated cavity is suddenly disclosed by the tissue in the neighbourhood of the external os giving way (Figs. 120, 121).

There are two rarer varieties of the intracervical cancer: one which commences in the cervical canal just within the external os, and quickly forms either an ulcer or a proliferating growth into the

FIG. 121.—CARCINOMA OF THE CERVIX: INTRACERVICAL; ULCERATION LIMITED TO CERVIX.

Similar to Fig. 120, but less excavation of the growth and no pyometra.

vagina; and the other which commences at the extremity of a cervical gland, and forms at first a discrete nodule in the cervix, breaking down later into an ulcer.

Method by which Carcinoma of the Cervix spreads.—Carcinoma spreads in two ways—by infiltration and by permeation.

Infiltration.—By infiltration is meant the pressure destruction of tissue in the neighbourhood of the growth.

In carcinoma of the cervix this infiltration may take place in one of several directions. Thus, it may occur downwards into the vagina and vulva; forwards into the bladder and urethra; back-

wards into the utero-sacral ligaments and the peritoneum of the pouch of Douglas, eventually reaching the rectum; outwards into the cellular tissue of the broad ligaments and into the ureters; and upwards into the body of the uterus. The direction in which infiltration occurs depends partly upon the variety of the cancer; thus, columnar carcinoma infiltrates the cellular tissue in the neighbourhood of the uterus more quickly than squamous-celled carcinoma, which tends in its early stages to spread downwards. Infiltration of the bladder and the resulting vesico-vaginal fistula occurs in 44·2 per

Fig. 122.—Carcinoma of the Cervix, spreading up into the Body. Fibroid in the Fundus.

cent. of cases dying of the disease unoperated upon, infiltration of the rectum in 16·5 per cent. of the cases, and the double fistula in 9·4 per cent. Infiltration of the body of the uterus is rare; more frequently the endometrium becomes infected with septic organisms, and the Fallopian tubes are subsequently involved, sometimes with resulting pyosalpinx (Fig. 122). Rarely the growth obstructs the cervical canal and a pyometra is formed (see p. 387).

Permeation.—By permeation is meant a growth of cancer cells along lymphatic channels, with the result that the lymphatic glands

are affected, and in advanced cases also certain of the distant organs. The lymphatic channels of the cervix run outwards in the parametrium to the external iliac and obturator glands, and these glands are connected up with the lumbar glands.

In the series already quoted the iliac and lumbar lymphatic glands were most often involved, and the commonest sites for metastases were the liver, lungs, and peritoneum, in this order.

Duration of the Disease. The estimation of the duration of the disease can only be properly considered with cases which are not operated on. The duration gradually increases with the age of the patient, and reaches its maximum between sixty and sixty-four, and then decreases quickly to its minimum between seventy-five and seventy-nine. From the first symptom to death the duration has varied between three months and seven years, the average period of 2,111 cases being 1·7 years. It must, however, be borne in mind that such estimates are only made from the appearance of the first symptom, and that prior to this the disease must have been present; also that in a few cases the symptoms of hæmorrhage and discharge have been very late in appearing, and occasionally they have even been reported to be absent.

Cause of Death.—The commonest cause of death is exhaustion due to vomiting, starvation, sepsis, pain, and hæmorrhage. Next in order of frequency is uræmia due to involvement of the ureters. Exhaustion and uræmia account for the great majority of the deaths. Rarely death may be directly due to hæmorrhage, septic infection, pulmonary embolism, or pyæmia following venous thrombosis; to peritonitis, intestinal obstruction, pyelitis, or to secondary deposits in the lungs or some other organ.

CHAPTER XLIV

TUMOURS OF THE UTERUS—*Continued*

DIAGNOSIS OF CARCINOMA OF THE CERVIX.

Carcinoma of the cervix is diagnosed with certainty only by a vaginal examination of the patient and a microscopical examination of the growth. A correct diagnosis can easily be made if the growth is advanced, but in early cases the most experienced may require to examine a section of the diseased area before a positive opinion can be given. Some of the symptoms of carcinoma of the cervix, when observed in their proper light, may also be a valuable help in the diagnosis; indeed, it is because of them, as a rule, that the patient is first led to consult a doctor.

It is a tragedy, however, that in a large number of cases these very symptoms are neglected or misconstrued, and in consequence the only certain method of diagnosis is neglected until the disease has so far advanced that any chance of saving the patient is lost. This pitiable state of affairs is brought about partly by ignorance and partly by carelessness, not only on the part of the patient herself, but also on the part of her friends, trained nurses, or even of her own doctor, whom she may have consulted. The symptom that is most often ignored is hæmorrhage, and for the following reason: Carcinoma of the cervix appears in the majority of women at or about the time that the change of life is expected. The idea is ingrained in all women and many doctors that the menopause is normally associated with irregular or excessive bleeding, or perhaps both, and therefore either from ignorance or carelessness the irregular hæmorrhage of carcinoma is attributed to the change of life, and a local examination is not sought or made until the persistence of the bleeding or the advent of other symptoms makes one imperative. It is true that in a fair number of women the menopause is associated with menorrhagia, metrorrhagia, or both, that no local disease can be found for such, and that the woman is quite well again when the change of life has terminated. Nevertheless, the student must remember that the menopause should not normally be associated

with such hæmorrhages, which, in the absence of any lesion, are probably due to vasomotor changes, and that their appearance should indicate the necessity for a thorough local examination. But even when the patient is not of the age above indicated, irregular hæmorrhage should always excite suspicion. Metrorrhagia necessarily means that some portion of the genital tract is at fault, and whatever the age of the patient a local examination should be insisted upon. These remarks apply more forcibly to women in whom menstruation has ceased.

The change of life must never be diagnosed as the cause of bleeding until every other cause has been excluded.

The fact that the patient bleeds after coitus or after a digital examination or the insertion of a vaginal douche-nozzle is of outstanding importance, since, although similar bleeding may be induced in certain cases of erosion of the cervix or mucous polypi, and senile vaginitis with adhesions which separate easily, this is extremely rare, and the vast majority of women in whom this symptom is noted have cancer.

Very rarely hæmorrhage is a late symptom, and, as has already been noted, cases have been reported in which there was not any bleeding from start to finish.

In most cases carcinoma of the cervix cannot be diagnosed from the presence of discharge alone until it is past any hope of radical treatment.

The extremely offensive discharge present in the later stages of carcinoma of the cervix may be mimicked by a septic abortion, a sloughing fibroid, or a pyometra (which itself is generally due to cancer)—all conditions which, on account of the ill-health or history of the patient, should have indicated a thorough pelvic examination.

The presence, therefore, of a non-offensive discharge, in the absence of hæmorrhage or other symptoms, is often neglected, because it is the common belief, especially among women themselves, that cancer is only present when the discharge is offensive. The remaining symptoms, such as pain, cachexia, and wasting, appear so late in the disease that they are of no value in its diagnosis. From what has been said, therefore, it will be readily realized that the symptoms of carcinoma of the cervix are only of value in drawing attention to the absolute necessity for a proper local examination: and this being so, it is the duty of every doctor to insist, as far as he can, on making a thorough investigation when consulted, no matter what objections are advanced by the patient.

The ease and certainty, or otherwise, of diagnosing cancer of the cervix depends upon the age and variety of the growth. In this

respect, patients seeking advice may be divided into several classes:

1. When the growth is very early and appears as an indurated patch on the vaginal portion of the cervix.

2. When there is an ulcer on the vaginal portion of the cervix.

3. When the vaginal portion of the cervix is enlarged either by a fibroid tumour or by chronic cervicitis and by hypertrophy.

4. When there is a growth springing from the cervix.

5. When there is a swelling projecting through the external os.

6. When the supravaginal cervix is enlarged and indurated.

Indurated Patch on Vaginal Cervix.—A growth so early as this is very seldom seen, and is discovered either during the routine examination of a patient for some complaint which does not suggest cancer, or at times from the symptom of bleeding after coitus. Such bleeding would, undoubtedly, more often draw attention to the disease was it not a fact that this complaint is likely to be tolerated by many women for some time before they seek advice, in addition to which the majority of the patients are of such an age that a frequent repetition of the bleeding from such a cause is unlikely. It is in early cases such as these that the serious mistake of attributing the red patch on the cervix to an "erosion" is made. If due care is used, there should not be any danger of such a mistaken diagnosis.

An erosion is velvety on the surface, and is not friable.

A carcinoma is rougher and friable.

There is no definite edge to an erosion.

The edge of a carcinoma is raised, rolled, and everted.

An erosion is bright red, spotted, perhaps, with islets of healthy mucous membrane.

A carcinoma varies in colour, and may have small spots of hæmorrhage and small green or black sloughs in its substance.

Both an erosion and a carcinoma may bleed on being touched; but an erosion oozes gently from many small spots, a carcinoma bleeds freely from one spot.

Mere hardness of cervix is not in itself suggestive of carcinoma, though the surrounding tissues in a carcinoma may be indurated.

The most important clinical sign of an early carcinoma is its friability. The point of the uterine sound will sink into it readily, whereas it will only dimple in the tissues of an erosion.

In any case of the least doubt, a wedge-shaped piece of tissue, including the surface epithelium and subjacent muscle, should be cut out with a scalpel, and submitted to microscopical examination (see pp. 202-205 and Figs. 82, 123, 124, 125, 126).

An Ulcer on the Vaginal Portion of the Cervix.—In advanced cases of ulceration of the cervix there can be no doubt of the diagnosis from the signs—marked friability of the tissue affected and the fixation of the uterus. The only condition likely to be mistaken for this variety of cancer is advanced tuberculous ulceration of the cervix, in which case the uterus is not fixed as it would be with a similar amount of disease due to carcinoma.

Small tuberculous and syphilitic ulcers, and ulceration due to prolapse or long-continued pressure from a pessary, have occasionally been mistaken for cancer. As a primary disease tuberculosis of the cervix is rare; the presence, therefore, of tubercle in some other part of the body should arouse suspicion. Moreover, the edges of a tuberculous ulcer and its tissues are not friable; irregular hæmorrhage is also absent. In cases of doubt a microscopical examination will settle the diagnosis.

Syphilitic ulceration of the cervix is very rare; the surface of the ulcer is not friable, and it does not bleed so easily. There may be other signs of syphilis present, and rarely a history of infection may be obtained. In such cases Wassermann's test is indicated.

Vaginal Cervix enlarged.—A small fibroid of the cervix may resemble a columnar carcinoma of the cervix commencing at the extremity of one of the cervical glands. An incision into the growth will settle the diagnosis apart from a microscopical examination, since the fibroid would be encapsulated and could easily be enucleated, whereas the carcinoma would infiltrate the tissue in its immediate neighbourhood and would be friable. One of the commonest conditions to be mistaken for carcinoma of the cervix is the hypertrophy and chronic inflammation associated with some cases of lacerated cervix. In these the tissue is hard and an erosion may be present, the exposed cervical mucous membrane red and inflamed, and the anterior or posterior lip, or both, enlarged and ill-shapen. A careful examination will, however, disclose that there is a laceration, that the reddened surface does not bleed on being touched, and that the tissue is not friable. If any doubt exists, a microscopical examination should be made of the suspected tissue.

Growth arising from the Cervix.—An ulcerated fibroid arising from the cervix may, because of the bleeding and offensive discharge, give rise to a suspicion of carcinoma. The diagnosis of such a condition, however, is quite easy, since the fibroid is hard and not friable, is smooth except at the ulcerated spot, has a pedicle, and does not bleed easily on palpation.

Extracervical carcinoma projecting into the vagina is rough,

soft, friable, has no pedicle, and bleeds extremely easily, and sometimes very seriously, if pieces of it are detached.

Swelling projecting through the External Os.—Intracervical carcinoma, as already noted, may, when commencing low down in the cervical canal, give rise to a fungating growth projecting through the external os into the vagina. A sloughing fibroid polypus might present a somewhat similar appearance. In this case the vaginal portion of the cervix would look healthy, and the external os normal, except as to its size. The uterus would be mobile, whereas with carcinoma as advanced as this it would most likely be fixed: the growth would be hard, smooth, and not friable, and if the cervical canal was sufficiently dilated a pedicle could be felt. The discharge of a sloughing fibroid polypus is so offensive and the hæmorrhage so free that the condition has often been mistaken for carcinoma. On occasions a septic piece of retained placenta, which gives rise to hæmorrhage and a very offensive discharge, has during its extrusion through the cervical canal been mistaken for cancer. The examination of the tissue removed will be sufficient to make a diagnosis apart from the history which would be very suggestive.

It must be remembered, however, that it is possible for a woman with fairly advanced cancer to be pregnant.

Supravaginal Cervix enlarged and indurated.—In advanced cases, in which the vaginal portion of the cervix has ulcerated away, there can be no mistake. Ulceration, however, in these cases takes place fairly late, and a bimanual examination simply reveals an enlarged and indurated cervix. It is possible that such an enlargement might be mistaken for hypertrophy of the cervix or for a fibroid of the cervix. The symptoms, however, of hæmorrhage and discharge would raise a suspicion; the fact that the uterus was somewhat fixed, and that a rectal examination showed that the base of the broad ligament and the utero-sacral folds had become infiltrated, would give a further clue to the diagnosis. In earlier cases it may be thought necessary to dilate the cervix to determine the diagnosis, and if intracervical carcinoma is present the cervical tissue will be found to be very friable, and perhaps ulceration will have already occurred in the centre of the growth.

Prognosis.

The prognosis of carcinoma of the cervix is very bad the large majority of the cases proving fatal. This result is due in the main to two factors. In the first place, owing to carelessness, ignorance, or fear, patients do not come under observation until the disease

FIG. 123.—NORMAL EPITHELIUM OF CERVIX.

1 Tall columnar epithelium; 2, glands lined by a single layer of tall epithelium; 3, stroma of fibrillated connective tissue.

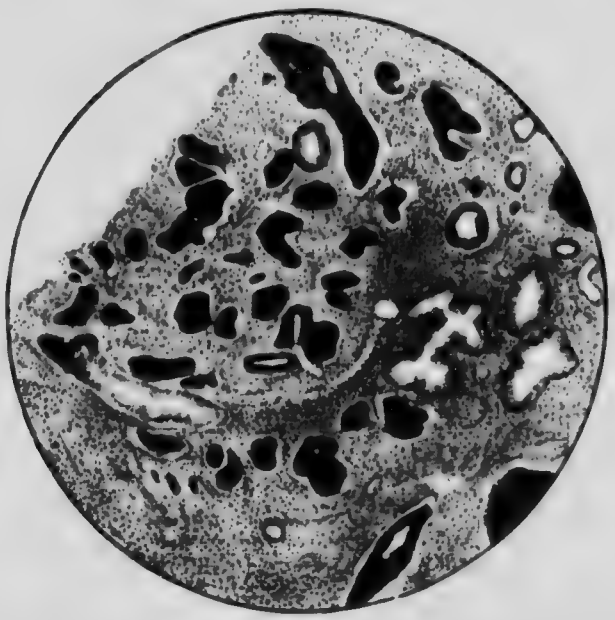


FIG. 124. -CARCINOMA OF THE CERVIX: MICROSCOPICAL SECTION OF GROWING EDGE, SHOWING COLUMNS OF PROLIFERATING EPITHELIUM WITH SMALL-CELLED INFILTRATION IN SURROUNDING CONNECTIVE TISSUE.

A few normal cervical glands are seen in unaffected area.

FIG. 125.—COLUMNAR-CELLED CARCINOMA OF THE CERVIX OF THE UTERUS (LOW POWER).

Note the proliferation of the glandular epithelium. Compare with the preceding figures.

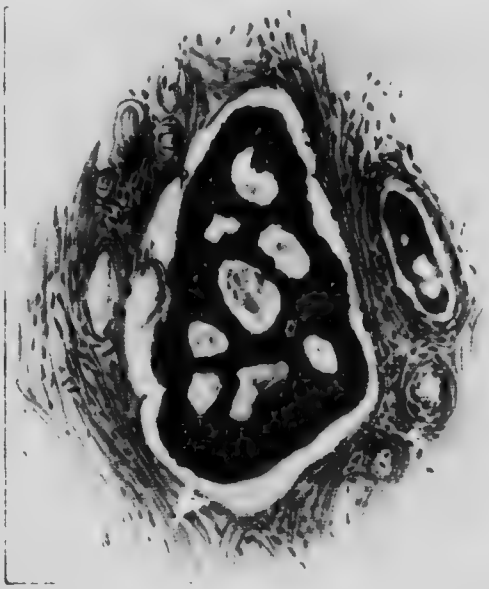


FIG. 126.—COLUMNAR-CELLED CARCINOMA OF THE CERVIX OF THE UTERUS: ONE OF THE EPITHELIAL ALVEOLI HIGHLY MAGNIFIED.

is so advanced that any hope of radical treatment is out of the question. In the second place, even if the case is operable, the method of removal still employed by many operators is of such a nature that only in the very earliest cases is a cure likely to result, and generally the disease returns within two or three years. With the modern extended operation the prospect of cure is much brighter. This aspect of the prognosis will be further dealt with under the heading of Radical Treatment (see p. 598).

As in carcinoma elsewhere, the younger the patient the worse the prognosis. Recurrence is almost inevitable, however radical the operation, in patients under thirty.

Pathology.

According to the variety of carcinoma, the situation in which it started, and the age of the disease, the growth in the cervix may present as a small hard nodule; as a small or deeply excavated ulcer; as a hard infiltrating enlargement of the whole of the cervix or of its supravaginal portion; or as a proliferating growth at times large enough to fill the whole vagina. The body of the uterus may be involved, and the Fallopian tubes may be inflamed and distended with pus. Microscopically extracervical carcinoma is seen to consist of numerous downgrowths of solid branching masses of epithelial cells from the squamous epithelium covering the vaginal portion of the cervix. These solid columns invade the muscle, and the growth is surrounded by well-marked round-celled infiltration (Fig. 124).

Intracervical carcinoma is manifest by downgrowths of hollow tubules derived from epithelium of the cervical canal or glands. The cells lining the tubules are larger than the normal cells, and are often several layers thick, so that the lumen may be almost completely blocked. The amount of stroma between the downgrowths is very scanty, and a small round-celled infiltration is present. The muscle is invaded (Figs. 125, 126).

CHAPTER XLV

TUMOURS OF THE UTERUS—*Continued*

TREATMENT OF CARCINOMA OF THE CERVIX.

The treatment of cancer of the cervix is either radical or palliative.

Radical Treatment.

The radical treatment of carcinoma of the cervix consists in the removal through an abdominal incision of the uterus and its appendages, and, by means of clamps, of sufficient vagina to form a bag in which the diseased cervix can be encapsuled. In addition the parametrium and as much connective tissue as possible is dissected out, together with as many regional glands as the operator may deem advisable.

The value of such an operation from a pathological standpoint is manifest, since not only is growth by infiltration, which is a slow process, eradicated thereby, but extension by permeation along the lymphatics and glands can be dealt with. In addition, the removal of the cervix in a bag of vagina practically abolishes the risk of cancer implantation, a frequent cause of recurrence in the older methods of operating.

The primary mortality of such an operation is undoubtedly high, ranging with the experience of the operator and especially with the type of case chosen. In early cases it is as low as 5 per cent., and in advanced cases as high as 25 per cent.

When considered from the standpoint of operability, this method far exceeds any other yet devised; for whereas the average operability-rate by individual operators using the older methods seldom reached 12 per cent., that of the radical operation works out at from 40 to 75 per cent., according to the operator. It is therefore obvious that a very much larger number of patients thus afflicted have a chance of cure by the radical operation, which could not be given to them by the older methods.

From the standpoint of prolongation of life and cure equally

remarkable results are obtained. Without entering into details, if the patient survives the operation, her life is markedly prolonged in most cases; and even with the strictest method of calculating (which includes all deaths from the operation, the counting as dead those cases which cannot be traced, and allowing an interval of five years to elapse from the operation), the percentage of absolute cures is probably above 30 per cent., a result not approached with any other method of treatment.

It is true that, owing to the high mortality of the operation, a certain number of patients will have their lives shortened, but it must also be remembered that, apart from operation, the death-rate of this disease is 100 per cent.

For the principal steps of the operation the student is referred to pp. 598-600.

As to whether the disease is too far advanced or not for a radical operation rests largely with each individual operator, and that this is so is proved by the reports of the various operability-rates. In doubtful cases a careful vaginal and rectal examination should be made under an anæsthetic. Partial fixation of the uterus does not contra-indicate the radical operation, for most, if not all, of this fixation may be due to inflammation of the parametric tissue, and not to an extension of the growth. The fact that the uterus cannot be pulled down is of no consequence so long as it can be pushed up. Infiltration of the rectal or vesical wall contra-indicates the operation, as also does the presence of large masses of glands in the pelvis. Isolated glands though enlarged need not deter operation, as they may be only inflamed, and can usually be removed.

Severe constitutional disease of the patient is a contra-indication, and the results of operating upon patients over sixty years of age are distinctly bad, as are also those of operating on very fat women.

Palliative Treatment.

The palliative treatment of carcinoma of the cervix is concerned with the relief of the various symptoms already enumerated, and is best discussed in connection therewith.

Hæmorrhage.—The hæmorrhage if slight may be neglected, since the administration of drugs has no effect. If, however, the bleeding is troublesome or severe, it may be controlled as a rule by hot douches or by plugging the vagina, and that part of the plug nearest the growth may be saturated with acetic acid or adrenalin. The bleeding may also be arrested for the time being by thoroughly scraping the growth, and afterwards applying the actual cautery or acetone.

Acetone acts by destroying part of the affected tissue to which it is applied and hardening the rest. This treatment may be carried out twice a week by inserting a Fergusson's speculum, raising the pelvis and pouring the drug into the speculum, and letting it remain *in situ* for ten minutes, after which it must be run off. Care must be taken to protect the vagina. The application of X-rays will in some cases stop the bleeding, and the insertion of radium into the growth certainly has this effect.

Discharge.—A slight non-offensive discharge is best treated with douches of boric acid or subacetate of lead. When the discharge becomes offensive, sanitas (half an ounce to a pint), creolin, saponated cresol (a drachm to a quart), formalin (1 in 2,000), tincture of iodine (2 drachms to a pint), cusol, or peroxide of hydrogen (1 in 10), may be substituted.

If the discharge is very troublesome, it can be arrested, for the time being, by scraping the growth and applying the actual cautery or acetone. X-rays may also be employed or radium inserted.

Pain.—The pain associated with carcinoma of the cervix is very variable, but when present it may cause much suffering and distress. It can, of course, be relieved by opium in some form or other; a pill of codeia containing half a grain does not tend to cause nausea or constipation to the same extent that opium and its other alkaloids do. Suppositories of morphia are also useful, and a mixture containing liquor morphinæ (mxx.) and infusion of gentian, to an ounce, can be prescribed. The treatment of pain by opium is, however, to be postponed as long as possible, since, owing to the ease with which the drug is tolerated, the dose has to be increased from time to time, until at last the state of the patient becomes most distressing. There is great difficulty in securing a proper evacuation of the bowels, nausea is always present, the patient refuses food, her mind becomes clouded, and at last, if opium has been given for a long time, the patient, unless under the influence of the drug, becomes very noisy and restless.

No drugs except opium and its derivatives will control the pain for any length of time, and the experience of the cancer wards of the Middlesex Hospital shows that most relief is obtained by changing the drug directly its effect appears to be waning. The following drugs may be usefully employed: acetyl-salicylic acid, pyramidon, phenacetin, antipyrin, bromides, chloral, paraldehyde, and sodium salicylate, either alone or in some cases in combination, and belladonna suppositories. Of these acetyl-salicylic acid is the most generally useful. In the end some preparation of opium will be

necessary. The insertion of radium may relieve the pain for a time or may increase it.

Pruritus.—Pruritus due to the discharge from the growth or to rectal and vesical fistulæ should be treated by regular douching, by keeping the vulva as clean as possible, by frequently changing the diapers, by the various methods of treatment enumerated under the heading of discharge, and by smearing the vulva and thighs with carbolized vaselin 3 per cent. or with a mixture of paroleine and zinc ointment.

Odour in the Room.—The offensive discharge associated with cancer of the cervix may render the room in which the patient is lying almost uninhabitable unless proper precautions are taken. The odour can be eradicated if one or other of the various measures already enumerated is employed and the strictest cleanliness is observed. Draw-sheets and diapers should therefore be changed when soiled, and this may require six or eight changes of draw-sheets in the twenty-four hours, and more frequent changing of the diapers.

General Treatment.

Constipation is often most troublesome, and, as apart from its other drawbacks, it tends to increase the sufferings of the patient, measures must be taken to relieve it. Here again the effect of any particular drug appears to wear off soon, and so this symptom is best treated by changing the aperient from time to time. Liquid paraffin in many cases is successfully employed. Loss of appetite is best treated by varying the diet, and indigestion by appropriate mixtures. Methylene blue in doses of 2 to 6 grains daily, combined with strychnine or arsenious acid, at times improves the general health temporarily, and in some cases relieves the pain. The effects of septic absorption due to the presence of a pyometra can be relieved by evacuating the pus. Sleeplessness is best treated by the various hypnotics and analgesics already mentioned. The patient should be encouraged to get into the open air as long as she is able.

Treatment by X-Rays and Radium.

Radium.—The treatment of carcinoma of the cervix by radium has not come up to the expectations that were formed of it with respect to its curative properties. A sufficient time has not yet elapsed to arrive at any definite conclusion, and it may be that it has not been extensively tried in sufficiently early cases, since most authorities contend that such cases should be treated at once by complete removal of the affected organ. Radium controls for a

time the hæmorrhage and the discharge, and in many cases relieves the pain. In addition the growth sensibly decreases in size, and, in fact, in some cases it has disappeared entirely from the vagina, a small puckering scar being all that remained at the roof of this canal. In most of these cases, however, there has been a recurrence of the growth; nor is this to be wondered at, when one remembers that the action of radium does not extend much beyond half an inch, and that, as it is generally employed in inoperable cases, there are masses of cancer cells outside its sphere of action.

In many patients its use is contra-indicated owing to the proximity of the bladder and rectum to the growth. When employed in this class of case, radium rapidly causes vesico-vaginal or recto-vaginal fistulæ, and thus adds to the miseries of the patient while not holding out any prospect of cure.

The best dose, the best screen, the thickness of the screen, and the duration of the application, are not yet settled. The results mentioned have been obtained with 240 milligrammes inserted into the growth for eight hours.

X-Rays.—It is impossible to tell whether X-rays applied to any particular patient will do good or not. In some cases the pain becomes less; ulcers heal, the bleeding is stopped or diminished, as is also the discharge, and the patient improves. This improvement may last for weeks or months, and in a few cases it is stated to have lasted over a year, though it is never permanent.

CHAPTER XLVI

TUMOURS OF THE UTERUS—*Continued*

CARCINOMA OF THE CORPUS UTERI.

Carcinoma of the body of the uterus is rare before the menopause; the average age at which it occurs is about fifty-five.

Symptoms.

The symptoms of carcinoma of the body of the uterus resemble those of carcinoma of the cervix. The bleeding, which does not make its appearance so early in the disease, is irregular, and the amount as a rule is not so great as in carcinoma of the cervix; whilst it has no relation to coitus, douching, or digital examination. Pain may occur rather earlier than in cancer of the cervix. Wasting, cachexia, and offensive discharge and symptoms due to the involvement of the ureters are later in making their appearance, the growth not spreading so rapidly; whilst the symptoms due to involvement of the vagina, bladder, and rectum are necessarily delayed for the same reason.

Signs.

With the increase in size of the growth the uterus becomes regularly enlarged, and eventually, with the extension of the growth to neighbouring structures, it becomes fixed. Fixation, however, is a late sign, since the extension of the disease is a comparatively slow process in comparison with that which obtains in carcinoma of the cervix. If during an examination of a patient the passage of a sound into the uterus causes unusual bleeding, and perhaps the expulsion of small fragments of tissue, carcinoma must be suspected, and the cavity of the uterus will be found to be enlarged except in certain cases mentioned later. It is not advisable, however, if cancer is suspected, to pass a sound with a view to elucidating the diagnosis, since the uterine wall is soft in the neighbourhood of the growth. The sound may easily perforate the uterus, with disastrous results. On a dilatation of the cervix for the purpose of diagnosis, malignant disease of the uterus may be disclosed by the presence of a soft tumour or an irregular ulcer, either of which

bleeds very easily and is friable. In very early cases the nature of the disease can be determined only by a microscopical examination of the scrapings removed by the curette (Fig. 127).

Method by which Carcinoma of the Body spreads.—Carcinoma of the body spreads by infiltration and permeation (see p. 363).

The process of infiltration and permeation is, however, much slower than in carcinoma of the cervix; involvement of the bladder, rectum, and vagina, are rarer, and only occur in the last stages of the disease, but involvement of the peritoneum occurs much earlier. Infection of the lumbar glands from permeation is also much later.

FIG. 127.—CARCINOMA OF THE CORPUS: CERVIX NOT INVOLVED.

The Fallopian tubes and ovaries may be involved by direct extension, and if the patient lives long enough other adjacent structures are involved as in carcinoma of the cervix, and secondary deposits may be found in the abdominal cavity.

Duration of the Disease.—The duration of life in cancer of the body is longer than it is in cancer of the cervix. For further remarks on this point the student is referred to p. 365.

Cause of Death.—The causes of death in cancer of the body are similar to those already enumerated for cancer of the cervix, and occur in the order given on p. 365.

Diagnosis.

Except in advanced cases, in which the uterus is fixed and the disease has spread to the cervix and vagina, the diagnosis of cancer of the body of the uterus can only be definitely determined by an intra-uterine exploration and a microscopical examination of any tissue removed. The symptoms, however, will cause suspicion, more especially that of bleeding, which as a rule first occurs at or after the menopause, the average age for its incidence being about fifty-four.

The remarks already made on p. 72, as to the necessity of determining the cause of unusual hæmorrhage in a woman, apply with equal importance here. In the majority of cases of cancer of the body, the bleeding occurs after the cessation of menstruation.

For purposes of diagnosis, cases of carcinoma of the body may be divided into three classes:

1. Those in which an increase in the size of the body of the uterus can be detected.
2. Those in which the body of the uterus is not appreciably enlarged.
3. Those in which the body of the uterus is atrophic.

Cases in which an Increase in the Size of the Body of the Uterus can easily be detected.

Under this heading we have to consider fibroids of the uterus, and pyometra, as well as carcinoma of the body.

Fibroids of the Uterus.—Fibroids of the uterus giving rise to symptoms for the first time at or after the menopause are rare. If a patient had suffered from menorrhagia and metrorrhagia long enough for other symptoms and signs of malignant disease to declare themselves, and yet these were absent, this is sufficient in most cases to exclude malignant disease. It must be remembered, however, that it is not particularly uncommon for carcinoma of the body to be associated with a fibroid tumour, and sarcomatous growth in a fibroid may rarely occur. The symptom of irregularity and a marked increase in the amount of the bleeding, therefore, in a patient known to have a fibroid tumour, should always arouse the suspicion of malignancy, more especially if the menopause is imminent or past. In certain cases, however, an interstitial fibroid of the uterus which has not caused any hæmorrhage may, with the atrophy of this organ following the menopause, become extruded as a polypus into the cavity of the uterus. Or, again, the atrophy

of the uterus, diminishing the blood-supply of the tumour, may cause it to degenerate. In either case hæmorrhage will result, and if the tumour becomes infected an offensive discharge will appear. Lastly, the presence of the polypus in the uterine cavity, or the degeneration of the fibroid, will occasion pain.

In such cases, therefore, we have an enlarged uterus in a woman, at or past the menopause, suffering from hæmorrhage, offensive discharge, and pain, or from one or other of these symptoms—a clinical picture of malignant disease of the uterus.

The diagnosis must be made by dilating the cervix and determining the nature of the growth, although a markedly enlarged uterus that was freely movable would suggest a fibroid rather than malignant disease. It must be remembered, however, that infiltration and permeation are late phenomena in malignant disease of the body. Rarely an infected fibroid may involve the peritoneum and cellular tissue in its immediate neighbourhood, and so fix the uterus.

The fact that nodules can be felt on the surface of the uterus is in favour of their being fibroid in nature, although with advanced malignant disease the growth may appear on the peritoneal surface.

Lastly, if an intra-uterine examination is not made, and because of its mobility it is determined to remove the uterus by an abdominal hysterectomy, malignant disease will be suspected by the dark red colour, soft consistence, and irregular mass, of the tumour; whereas a fibroid is pale, hard, and presents as a rounded nodule. Even in such a case, however, a serious mistake may be made if a supra-vaginal hysterectomy is performed without examining the interior of the uterus for malignant disease which may have affected the endometrium.

Pyometra.—If the cervical canal is obstructed by new growth in the upper part of the cervix or by senile endometritis, the body of the uterus will become enlarged, and the absence of discharge may confuse the diagnosis. In addition, pyometra, associated with carcinoma of the cervix, at any rate, is accompanied by hæmorrhage and pain.

The septic condition may spread to the Fallopian tubes and peritoneum, so that the uterus is fixed, and the suspicion of cancer may be consequently enhanced. Patients suffering from pyometra, however, may or may not suffer from fever and other signs of septic absorption.

A dilatation of the cervix will settle the diagnosis.

Carcinoma of the Body of the Uterus.—After what has been written above on this subject, a further discussion is not necessary.

Cases in which the Body of the Uterus is not appreciably enlarged.

Under this heading we have to consider senile endometritis, small mucous polypus of the body, as well as malignant disease of the uterus.

Senile Endometritis.—The symptoms of senile endometritis are those of hæmorrhage and discharge, which is purulent and very offensive. The hæmorrhage is only slight, and is not such a distinctive feature as the discharge. Wasting and cachexia are absent. Pain is rarely complained of. The disease, as a rule, occurs late in life, and because of this and of its symptoms senile endometritis is apt to mimic carcinoma of the body.

On dilatation of the cervix sufficient to admit the finger, the surface of the endometrium will be found smooth and hard, and no undue bleeding is apparent on manipulation. In such cases the uterus will be curetted, and the scrapings on microscopical examination will resemble those described on p. 227. It should be remembered that senile endometritis is a much rarer condition than carcinoma of the body of the uterus, and in a considerable number of cases is a precursor of the disease.

Mucous Polypus.—A mucous polypus of the body of the uterus is a rare complication after the menopause, though cases have been reported in women over seventy years of age, the hæmorrhage starting twenty years after the menopause. The fact that the uterus is not as small as one would expect some time after the menopause, and the presence of the bleeding, will indicate the necessity for an intra-uterine examination, when the polypus will be discovered. Such a polypus, however, should always be microscopically examined, as it may be malignant.

Carcinoma of the Body of the Uterus.—Carcinoma of the cervix of the intracervical type may occur high up near the internal os, and may spread from there into the body of the uterus.

An intra-uterine examination suggested by the symptoms will disclose the nature of the growth.

For the diagnosis of sarcoma of the uterus the student is referred to p. 392. As a rule the nature of the growth will not be disclosed except by a microscopical examination. The symptoms of carcinoma of the body of the uterus will rouse a suspicion sufficient to warrant the cervix being dilated and an intra-uterine examination being made. The signs in such a case have already been described, and a microscopical examination of the tissue removed will settle the diagnosis.

Cases in which the Body of the Uterus is Atrophic.

Under this heading we have to consider senile endometritis and carcinoma of the body of the uterus.

Senile Endometritis. What has already been said in connection with this disease will suffice for its diagnosis.

Carcinoma of the Body of the Uterus. Occasionally carcinoma of the body of the uterus occurs in an atrophic uterus. In such cases, owing to the small size of the uterus, the symptoms may be attributed to senile endometritis. The possibility, therefore, of malignant disease must never be overlooked.

Prognosis.

The prognosis of carcinoma of the body of the uterus is good if the disease is diagnosed and the uterus and its appendages removed before the growth has exceeded the limit of the uterus, and before permeation has taken place.

Pathology.

Carcinoma may arise either on the surface of the endometrium or in its glands, and in nearly all cases is columnar-celled in structure. A very few cases of squamous-celled carcinoma have been reported supervening on a chronic endometritis, or in old women in whom the columnar cells of the endometrium have become flattened. The disease takes one of two forms: On the one hand, a friable fungating tumour may be found covering large areas of the endometrium, and perhaps filling the whole of the cavity; or polypoid tumours may be detected projecting from one or more areas, the intervening mucous membrane being apparently healthy. The uterus is distinctly enlarged. On the other hand, an irregular and diffuse ulceration may be felt spreading over the internal surface of the uterus. In such cases the uterus need not be enlarged. On microscopical examination of the tissue removed, there is seen to be a large increase in the number of glands, which in places are invading the muscular tissue of the uterus. There is very little connective tissue between the glands, and the epithelium lining them consists of many layers of a columnar type, in some cases filling their lumen (Figs. 128, 129).

Treatment.

The treatment of carcinoma of the body is either radical or palliative.

Fig. 128.—Normal Corporeal Endometrium: Simple Glands; Epithelium ciliated on the Surface.

Fig. 129.—Columnar-Celled Carcinoma of the Body of the Uterus: Epithelial Alveoli invading the Uterine Muscle.

Palliative Treatment.—The palliative treatment is concerned with the relief of those patients who cannot be operated upon, and what has been indicated in this respect with regard to carcinoma of the cervix applies equally well in this case, due allowance being made for the difference in situation of the disease. Thus, curetting has no part in the treatment of carcinoma of the body, for if such is attempted the uterus will surely be perforated, and the patient perhaps die of hæmorrhage or peritonitis.

Hæmorrhage, on the other hand, may for a time be controlled with ergot.

Radical Treatment.—There is no need to perform such an extensive operation as the "radical cure" in carcinoma of the body, since in a large number of cases the ordinary total hysterectomy is sufficient to cure the patient. For the steps of this operation the student is referred to p. 596. The ovaries should be removed. If the patient is very fat and the disease not advanced, it will be easier and just as safe to remove the uterus by vaginal hysterectomy.

CHAPTER XLVII

TUMOURS OF THE UTERUS—*Continued*

HÆMATOMETRA.

Cause.

The cervical canal may be obstructed as the result of some congenital malformation or as the result of adhesion following an acute cervicitis or sloughing.

If the patient menstruates, the cavity of the uterus will be distended with blood, as it will be also if the upper part of the vagina is obstructed from similar causes.

Malignant disease of the cervix may also obstruct the cervical canal and give rise to a hæmatometra, and such a condition may even occur apart from obstruction, if the uterus is so diseased that it cannot contract and expel the blood.

Lastly, the cervical canal may be obstructed by a fibroid of the uterus rotating the body on the cervix.

The commonest form of hæmatometra is that due to congenital obstruction. For the symptoms, signs, and treatment of this variety the student is referred to p. 117.

A very rare form of hæmatometra is that occasioned by the occlusion of the cervical canal of one half of a double uterus.

The diagnosis of hæmatometra due to malignant disease is of no clinical importance, the symptoms and signs of the disease being quite apparent before the blood is retained.

PYOMETRA.

Cause.

The uterus may be distended with pus as the result of occlusion of the cervical canal from inflammation or malignant disease, and it may occur without occlusion in cases of senile endometritis and malignant disease of the cervix. Pyometra is most commonly found in association with carcinoma of the cervix.

Symptoms.

The patient may have an intermittent, horribly offensive, purulent discharge. Abdominal pain and symptoms of septic absorption may be present, but general symptoms at times may be absent.

Fig. 130.—Carcinoma of the Cervix: Intracervical, showing Deep Ulceration and Extension into Body of the Uterus.

Cervix converted into a mere shell, although vaginal portion and external os show no change. The uterine cavity was slightly distended with pus.

Signs.

The body of the uterus is enlarged and sometimes tender. Although cancer is suspected or diagnosed, there is not any discharge; or if there is, as there may be when the cervical canal is not obstructed and the quantity of pus becomes excessive, then it is intermittent and extremely offensive (Fig. 130).

Diagnosis.

The diagnosis is concerned with the causative disease, and is dealt with under this heading.

Treatment.

The pus should be evacuated by dilating the cervical canal. Senile endometritis often requires hysterectomy (see p. 229).

CHAPTER XLVIII

TUMOURS OF THE UTERUS—*Continued*

SARCOMA OF THE UTERUS.

Cause.

Various factors, such as age, heredity, inflammation, and the presence of other tumours, are thought by some to have an influence in its origin; of these, only the first and last seem to have any special bearing. The liability to sarcoma of the uterus increases with the age of the patient up to fifty-five, and the greatest number of cases occur between forty-five and fifty-five.

Sarcoma of the uterus is a very rare disease; it has been noted eight times in 4,115 tumours of the uterus, and in the majority of cases reported it has been associated with a fibroid tumour of the uterus. Seventy-five per cent. of the patients have had one or more children.

Sarcoma of the body of the uterus is at least six times as common as that of the cervix.

Varieties.

Sarcoma, as elsewhere in the body, may arise in any connective tissue of the uterus. It may therefore arise in a fibroid of the uterus, in the muscle of the uterus, or in the stroma of the endometrium.

Sarcoma of the Corpus Uteri.—There are three definite varieties:

1. Intra-mural tumours.
2. Submucous tumours.
3. Polypi.

Intra-mural and Submucous Sarcoma.—These tumours originate in the muscle of the uterus or in a fibroid tumour.

Polypoid Sarcoma.—These tumours are really submucous sarcomata in the process of extrusion or arise in the connective tissue of the endometrium itself.

Sarcoma of the Cervi : Uteri.—Sarcoma botryoides is the name given to a particular form of the sarcoma starting in the stroma of the endometrium, although some authorities contend that it is merely the polypoid variety which has undergone cystic degeneration. It is most commonly found in infants and children.

The commonest variety of sarcoma found in the uterus is that associated with fibroids, which are often multiple. The estimate of its frequency in fibroids removed by operation varies, according to different authorities, from 1·4 to 4·3 per cent., the higher figures being reached when every single fibroid in the uterus was examined microscopically, and not only those which showed signs of degeneration.

Sarcoma occurring in the muscle of the uterus is nearly always circumscribed, and in the majority of cases the growth consists of spindle cells. Metastases occur more frequently in this than in the variety described next.

Sarcoma of the endometrium is rarer than that occurring in the muscle. It is generally diffuse, and as a rule it attacks the body of the uterus. When the cervix is affected, the growth is most often polypoid. In most cases the tumour consists of small round cells.

Symptoms.

The symptoms of sarcoma of the uterus resemble very closely those of fibroids and of carcinoma—namely, hæmorrhage, discharge, and pain. The discharge may be offensive and the pain an early symptom.

Signs.

Sarcoma commencing in the uterine muscle cannot, on palpation, be differentiated from a fibroid. It may be hard or soft, and may be smooth or nodular. It seldom grows to any great size, although the size on palpation will depend upon whether a fibroid is present in addition.

Sarcoma of the endometrium is soft, and can easily be broken up. Botryoid sarcoma is characterized by the presence of grape-like vesicles filled with a clear fluid or blood, and these vesicles may be so luxuriant that the whole of the vagina is tightly distended with them.

The cellular tissue is frequently invaded, the growth extending to the bladder and intestine. In a considerable number of cases the ovary is involved, and rarely the vagina.

Inversion of the uterus is occasionally found, and then generally in association with the polypoid submucous variety. Hæmatometra and pyometra may complicate the diffuse form.

Diagnosis.

Sarcoma of the uterus, if large enough to be felt on abdominal examination, is clinically indistinguishable from a fibroid undergoing degeneration. The fact, however, that the uterus rapidly increases in size, and is markedly softened, especially in young women, suggests sarcoma. Cachexia, ascites, and dilatation of the veins of the abdominal wall, occur later, but from the point of view of treatment are useless accessories to diagnosis. Then, again, the symptoms will most likely have appeared late in life, when as a

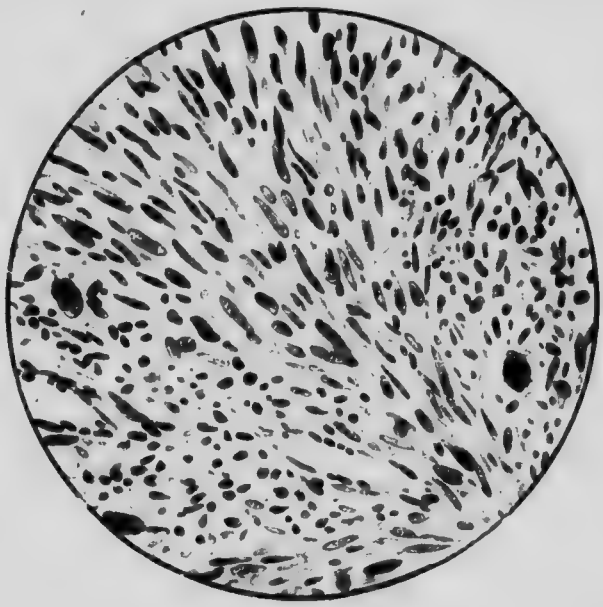


Fig. 131.—Spindle-Celled Sarcoma of the Body of the Uterus (High Power).

rule, if they are present, fibroids have ceased to cause any trouble. When the growth can be felt on vaginal examination, it is apt to be mistaken for carcinoma of the cervix or a polypus; and in the latter case it has been removed, has recurred, and has again been removed, in some cases two or three times, before its true nature was diagnosed. Sarcoma of the uterus not large enough to be felt on abdominal examination, and not originating in the cervix or projecting into the vagina, is most likely to be mistaken for carcinoma of the body of the uterus or senile endometritis.

FIG. 132.—RHABDO-MYO-SARCOMA OF THE BODY OF THE UTERUS (HIGH POWER).
Note that some of the large cell-elements show transverse striation.

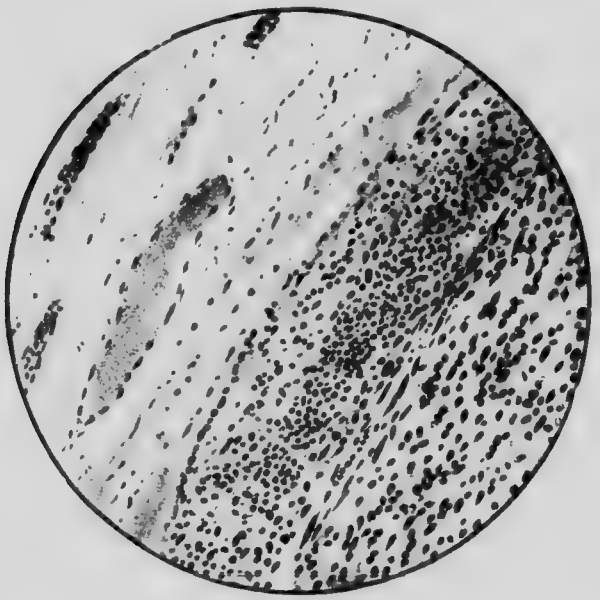


FIG. 133.—SARCOMA OF THE CERVIX: SMALL SPINDLE-CELL TYPE.

Pathology.

An intramural sarcoma is not encapsulated, but a sarcoma arising in a fibroid has a capsule of connective tissue surrounding it. A section of the tumour discloses a yellow, yellowish-white, or yellowish-pink surface, studded in some cases with areas of hæmorrhage and degeneration, either hyaline, œdematous, myxomatous, or cystic. The growth is friable.

The submucous sarcoma is softer than the intramural. It has more or less the appearance in section of an intramural sarcoma.

The ovaries are occasionally implicated, the Fallopian tubes very rarely.

The growth consists of masses of round, spindle, or mixed cells, a few giant cells, large bloodvessels of a rudimentary nature, and very little stroma (Figs. 131, 132, 133).

Prognosis.

Rapid recurrence following operative removal is common. The prognosis therefore is grave, but depends somewhat on the variety of the sarcoma and the character of its cells. Thus, a submucous sarcoma has a somewhat better prognosis than an intramural sarcoma, especially if it becomes polypoid and does not invade the wall of the uterus, whereas a pure round-celled intramural sarcoma is the most dangerous. In young children and infants the disease is a particularly fatal one. The prognosis must also depend upon the extent of the disease when it is first seen, whether it has invaded other parts, and whether metastases, which are most frequently found in the lungs, are present.

Treatment.

The uterus and its appendages must be freely removed by a radical abdominal operation.

For the palliative treatment in cases too advanced for radical operation, the student is referred to the section dealing with the treatment of carcinoma of the uterus (see p. 375).

CHAPTER XLIX

TUMOURS OF THE UTERUS—*Continued*

CHORION-EPITHELIOMA.

Nature of the Tumour.—The fertilized ovum normally burrows its way into the endometrium by means of its epiblastic or outer layers of cells, which are collectively known as the trophoblast, and which are specialized for fixing and nourishing the ovum in its early stages before the formation of the villi.

The trophoblast, in destroying the maternal tissues with which it comes into contact, excites a reactionary process therein, with a consequent hypertrophy and the formation of a decidua; and in time, if the pregnancy is normal, a balance is struck between the fœtal and maternal elements, and the further destruction of the latter is arrested coincidently with the development of the villi and the formation of the placenta, which now takes on the nourishment of the ovum. In certain circumstances, the cause of which is unknown, this equilibrium between the fœtal and maternal tissues is disturbed, and there result certain diseased conditions ranging from the comparatively simple to the superlatively malignant. Those conditions are divisible into three groups:

1. A simple vesicular mole in which the stroma of the villi is in part degenerated and the trophoblastic elements show marked proliferation, whilst the maternal tissue is invaded more than normally.

2. A malignant vesicular mole in which the changes just mentioned are more marked, and the maternal tissues are invaded by the overactive trophoblast cells, the growth at times perforating the uterus and forming occasionally secondary deposits resembling in structure either the whole diseased villus or its trophoblast alone.

3. The intensely malignant chorion-epithelioma, which consists entirely of cells of trophoblastic origin associated with large extravasations of maternal blood.

It will be seen, therefore, that chorion-epithelioma is usually a result of pregnancy, but it also occurs in teratoma of the ovary, testicle, and mediastinum. It may occur after a normal labour or

after a miscarriage, and over a third of the reported cases have followed the expulsion of a hydatidiform mole. Generally the tumour is detected soon after the termination of pregnancy, but in some cases several years apparently have elapsed before it appeared.

Seeing that the more often a woman becomes pregnant the greater will be the chances of her developing a chorion-carcinoma, the fact that this tumour is commoner in women who have had several children is only what one would expect.

Fig. 134.—Chorion-Epithelioma of the Body of the Uterus

Symptoms.

The leading symptom is hæmorrhage, frequently of a very severe type. Pain may be present, though it is not a marked symptom. Cough and hæmoptysis may occur early in this disease, and are due to secondary deposits in the lungs. Fever when present is declared by its usual symptoms, accompanied occasionally by rigors. Necrosis

of the tumour will lead to an offensive discharge. Some cases die of chronic septicæmia with the occurrence of bleeding.

Signs.

When the tumour has been present for any length of time, wasting and anæmia will be marked, and the latter may be an early sign if the hæmorrhage is severe.

The uterus is enlarged and nodules may be felt projecting from its outer surface. Fever is often present, and secondary deposits may also be detected in the lungs, brain, liver, vagina, and vulva.

At times pieces of the growth are expelled from the uterus with the discharge, and if these are examined microscopically the nature of the disease is determined (Fig. 134).

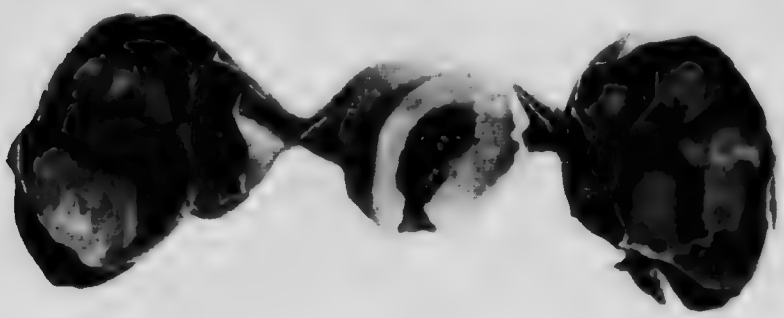


Fig. 135.—Chorion-Epithelioma associated with Cystic Disease of the Ovaries.

In a certain number of cases, bilateral ovarian tumours, which are lutein cysts, develop, large enough to be felt on abdominal examination (Fig. 135).

In this disease Abderhalden's reaction of pregnancy is said to persist.

Pathology.

The tumour, which commences as a small nodule, is claret-coloured from hæmorrhage, and very friable. It soon ulcerates, and, invading the wall of the uterus, enlarges this organ, and at times extends to its peritoneal surface, causing its contour to be irregular (Plate VIII.).

Microscopically the tumour is seen to consist of—

1. Large extravasations of maternal blood in which are buried irregularly the elements of the trophoblast.

FIG. 136.—CHORIONIC VILLI IN SECTION: EARLY WEEKS OF PREGNANCY, THE TWO LAYERS OF THE TROPHOBLAST WELL DIFFERENTIATED (HIGH POWER).

FIG. 137.—CHORIONIC VILLI: LAST WEEKS OF PREGNANCY.
Syncytium very distinct; Langhans' cells only seen here and there.

2. Large multinucleated masses of protoplasm without any cell boundaries (syncytium).

3. Well-defined polyhedral cells with clear protoplasm and vesicular nuclei (Langhans' layer).

4. Isolated cells somewhat larger than the polyhedral cells, with granular protoplasm and one or more nuclei (Figs. 136, 137, 138).

Vacuolation of the cellular elements is a striking feature.

Characteristic deposits are found in the lung, liver, ovary, brain, and vagina, which to the naked eye look like pieces of placenta.

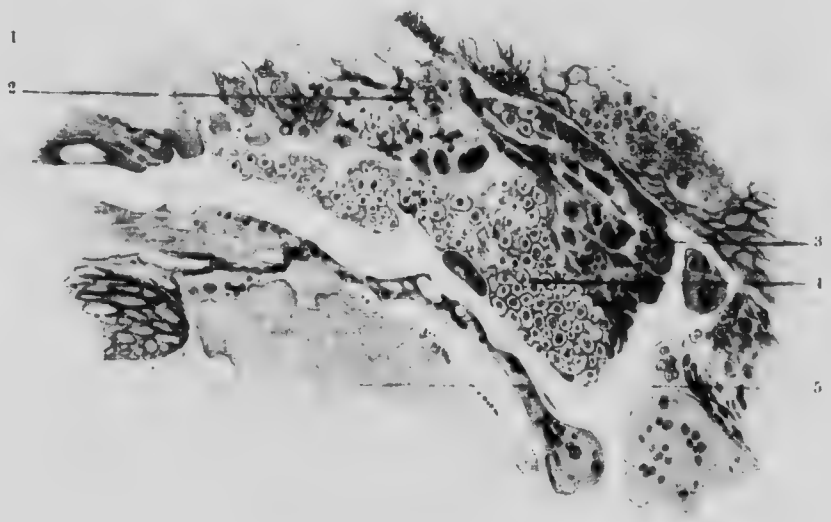


FIG. 138.—CHORION-EPITHELIOMA OF THE UTERUS (LOW POWER).

1, Uterine muscle; 2, chorion wandering cell; 3, syncytium; 4, Langhans' cells; 5, blood-clot.

DIAGNOSIS.

The diagnosis will rest on a microscopical examination of tissue removed from the uterus. As in the early stages the symptoms and signs markedly resemble those observed in cases of subinvolution due to retained placenta, with or without sepsis, the tumour is apt at first to be overlooked, especially when an internal exploration under an anæsthetic discloses what is thought to be a piece of placenta, which is thrown away without any microscopical examination being made. It will also be noticed, in these cases, that whilst the uterus is being cleared out the hæmorrhage is very severe.

In such cases, however, the patient does not improve under treatment, but gets so rapidly worse that suspicions are eventually aroused as to the true nature of the disease. Continued bleeding after the removal of a vesicular mole is also extremely suspicious. Later secondary deposits in the lungs and hæmoptysis and secondary deposits clinch the diagnosis.

Prognosis.

The prognosis is extremely bad, most of the patients dying within a few months, even after removal of the uterus, though a certain number have recovered after this operation. A few cases of recovery have been reported after simple curetting or no operation at all, and in these it is supposed that the extravasated blood must have destroyed the cells of the neoplasm. Cases of the rare and interesting variety in which the growth is apparently primary in the vagina, a vesicular mole occupying the uterus, are stated to have a relatively good prognosis by those who have investigated the histories of collected examples.

Treatment.

The uterus and its appendages should be removed as soon as the disease is diagnosed, together with any secondary deposits in the vagina or vulva that may be present. The ovaries, if unaffected, should be left in young women.

CHAPTER L

TUMOURS OF THE OVARY

Introduction.—Several methods of classifying ovarian tumours have been attempted. These growths have been divided up according as the tumour is solid or cystic, innocent or malignant; according to the microscopic character of the tissue contained in the growth; and, finally, according to the structure from which they are supposed to originate. No satisfactory scientific classification is as yet possible upon these lines, for the groups are not clearly defined, and tend to overlap one another. Thus, cystic tumours often contain solid masses, solid tumours develop cysts; apparently innocent tumours may show malignant characteristics; the same tumour may contain various tissue elements—adenomatous, papillomatous, and even teratomatous; and the histogenesis of these tumours is in some cases still undecided. It is proposed in this article to make use of the following classification, and in it are included tumours which, while they are not strictly of ovarian origin, yet arise from structures in the immediate neighbourhood of the ovary, and are clinically indistinguishable from ovarian tumours.

Classification.

The following groups of tumours may be described:

Innocent Tumours.

1. Distension cysts.
   - (*a*) Distension cysts of the Graafian follicle (hydrops follicularis).
   - (*b*) Follicular distension cysts.
   - (*c*) Corpus luteum cysts.
   - (*d*) Ovarian blood cysts.
2. Tumours of epithelial origin: cystic growths of new formation.
   - (*a*) Pseudo-mucinous cystadenoma.
   - (*b*) Papillomatous cysts.
3. Cystic embryoma (commonly called dermoids).

4. Tumours of connective-tissue origin.
   (*a*) Fibroma.
   (*b*) Fibromyoma.
   (*c*) Fibrous papilloma (warty ovary).
5. Mixed connective-tissue and epithelial tumours.
   Fibro-adenoma.
6. Broad ligament cysts.
   (*a*) Fimbrial cysts.
   (*b*) Parovarian cysts.
   (*c*) Hydrosalpinx of an accessory tubal ostium.
   (*d*) Cysts of the hydatid of Morgagni.
7. Tubo-ovarian cysts.

Malignant Tumours.

1. Carcinoma: tumours of epithelial origin.
   (*α*) Primary.
      (*a*) Solid carcinoma.
      (*b*) Cystic carcinoma.
   (*β*) Secondary.
2. Sarcoma: tumours of connective-tissue origin.
   (*α*) Primary.
      (*a*) Round-celled sarcoma.
      (*b*) Spindle-celled sarcoma.
      (*c*) Mixed-celled sarcoma.
   (*β*) Secondary.
3. Melanoma, endothelioma, and perithelioma.
4. Malignant embryoma.
5. Malignant papilloma.
6. Malignant tumours of the corpus luteum.

DISTENSION CYSTS.

(*a*) **Distension Cysts of the Graafian Follicle (Hydrops Follicularis).**—These cysts are not infrequently observed at operation or post-mortem examination. They appear as translucent vesicles projecting from the surface of the ovary, and are seldom larger than a golf-ball. They are usually single, but may be multiple. The name small cystic ovary has been given to an ovary in which from six to eight follicles have undergone simultaneous cystic change; it is often associated with signs of chronic inflammation.

Microscopic Section.—The cyst wall is composed of connective tissue, the outer layer of which is dense and fibroid. The smaller cysts may contain an epithelial lining of cubical cells; in the larger

cysts these cells when present are flattened, and may be entirely destroyed, owing to the pressure of the intracystic fluid. The fluid is of the same character as the ordinary liquor folliculi. It is of a pale yellow colour, low specific gravity, and contains albumin and sometimes blood-pigments.

These cysts are regarded as distension cysts of the Graafian follicle, and not as growths of new formation. It is believed that anything which hinders the normal rupture of the ripe follicle and the escape of the fluid contents will bring about the formation of

FIG. 139.—FOLLICULAR CYST OF THE OVARY.

the cyst. Rupture may be prevented by an unusually thick tunica albuginea, and the tissue around these cysts is often fibrous. It is possible that this change is due to the previous inflammation, and this view is further supported by the frequent presence of adhesions in the neighbourhood of the ovary. Another view of their pathology is that the smaller cysts are really only ripened follicles. Follicle cysts may appear at any age, and apparently do not affect menstruation or pregnancy. In some instances they are known to have undergone spontaneous rupture, and they occasionally collapse during the process of a bimanual examination (Fig. 139).

It is important to remember that in many cases the cyst wall can be shelled out without sacrifice of the ovary itself.

(*b*) **Follicular Distension Cysts** are usually small, but not necessarily so. Large unilocular ovarian cyst probably representing a distended follicle are by no means uncommon. Their contents are usually a clear serous fluid resembling dilute urine in colour. Sometimes, however, it is mucinous and gluey—such cysts may be regarded as unilocular cyst adenomata, the original follicular epithelium having taken on a definite secretory function.

Between such cysts and the typical multilocular ovarian cyst, there is no hard-and-fast line to be drawn. Probably all these typical glandular cysts have their origin in a glandular metamor-

Fig. 140.—Cystic Corpus Luteum.

phosis of the follicular epithelium. In these mucin-containing unilocular cysts the epithelium, unless flattened by pressure, is columnar.

(*c*) **Corpus Luteum Cysts.**—Cysts of the corpus luteum are usually single, but sometimes multiple. The tumours vary in size; commonly they are of about that of a golf-ball, but occasionally may be as large as the fœtal head, from the presence of several such cysts within the same ovary. They may be bilateral. The appearance presented is in some cases that of a thin-walled cyst; in others the walls are thick and opaque. The characteristic feature of these growths is the presence of yellow lutein tissue in their walls (Fig. 140).

The contents are of a jelly-like consistence, sometimes coloured by blood-pigment. More rarely they are clear and watery (Fig. 141).

Microscopic Section.—The outer wall is composed of modified and compressed ovarian stroma, and an inner wall containing lutein tissue, which in places may present a wavy appearance. There is a lining membrane in some cases; in others this is absent or only present in patches. This lining is composed of a single row of cubical cells resting upon the lutein tissue; when it is not present the cyst is lined by a structureless fibrinous material, probably representing the membrana propria of the Graafian follicle (Fig. 141).

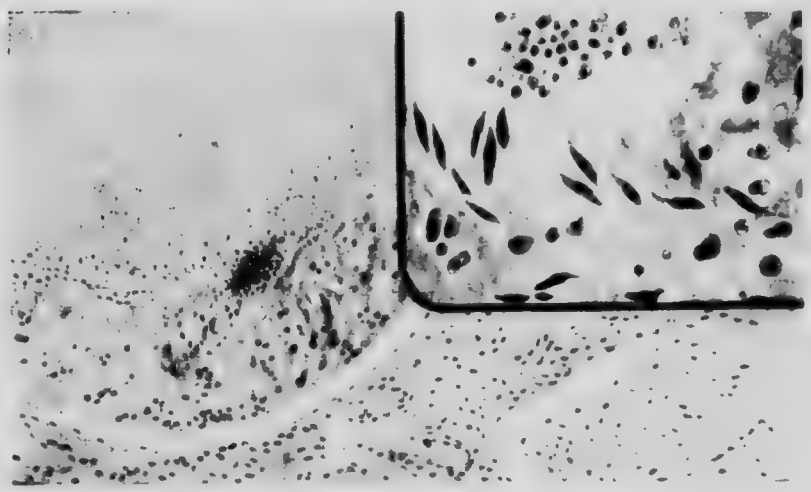


FIG. 141.—HAEMORRHAGIC CORPUS LUTEUM CYST.

Inset is a high-power drawing of the degenerate lutein tissue in the capsule.

Some connection appears to be established between the larger bilateral tumours and a recent pregnancy; especially is this the case if the pregnancy has been a vesicular mole or has been followed by a chorion-epithelioma. In a series of 84 collected cases of bilateral lutein cysts, the uterus contained a vesicular mole not followed by chorion-epithelioma in 44 cases; a vesicular mole followed by chorion-epithelioma in 18; and chorion-epithelioma developed after an abortion in 22. The tumours found in association with vesicular moles are not lutein cysts in the strict sense of the word, for they possess no definite cell lining, and the lutein tissue is diffusely scattered in their wall. It is this variety of lutein growth which is often bilateral, multilocular, and contains clear watery fluid, thus forming a contrast with the true lutein cyst, which is smaller, unilocular, and may contain viscid tarry blood (see Fig. 135).

In vesicular mole and chorion-epithelioma a characteristic feature is an overgrowth of the trophoblast, and it has been suggested that these diseases may result from an excessive production of lutein tissue, or that they may themselves cause the overgrowth of lutein cells.

In cases in which the expulsion of the vesicular mole has not been followed by the development of a chorion-epithelioma, it has been noticed that these lutein tumours shrink gradually until the ovary reaches the average size.

(*d*) **Ovarian Blood Cysts.**—Rupture by the Graafian follicle is normally accompanied by hæmorrhage into the follicle. Sometimes, for reasons unknown, the bleeding is excessive, with the result that the follicle becomes distended with blood. The occurrence of such excessive bleeding with each monthly period converts the ovary into an ovarian blood cyst. In appearance such a cyst is whitish-blue, because its wall is formed by stretched ovarian substance; but when the wall is thin enough the tarry brown-black contents show through. Adhesions are nearly always present.

These cysts are commonest in young women, and the history and physical signs are usually very distinctive.

The patient complains of pain at each period, increasingly severe, for three, six, or nine months. On examination a tumour or tumours (for the condition is frequently bilateral) can be felt behind and to the side or sides of the uterus.

These cysts may rupture spontaneously, filling the pelvis with their thick tarry contents and setting up local peritonitis.

Very rarely excessive hæmorrhage from the follicle may flow direct into the peritoneal cavity without intermediate cyst-formation. The symptoms then are exactly those of an early ruptured ovarian gestation, between which and excessive bleeding from the ruptured follicle the microscope is alone competent to decide.

TUMOURS OF EPITHELIAL ORIGIN.

Cystadenoma.

The two preceding cystic conditions which have been described are not growths of new formation in the strict sense of the word, for they arise from the distension of pre-existing follicles. The groups of cysts which are now to be described arise from epithelial cells; they are primarily adenomata, therefore, which have undergone an accompanying cystic change.

(*a*) **Pseudo-Mucinous Cystadenoma.** These cysts are usually pedunculated, but occasionally they burrow between the layers of the broad ligament.

They are the commonest variety of ovarian tumour to be met with clinically. The mass is rarely smaller than a fœtal head, but it may attain to an enormous size; and before ovariotomy was so safe an operation as it now is, enormous cysts were not infrequently seen. In the Museum of St. Thomas's Hospital there is a cyst of this nature which weighed no less than 166 pounds. The mass is usually rounded in shape. The surface is smooth, but it may present

FIG. 142.—MULTILOCULAR OVARIAN CYST WITH CYSTIC INTRACYSTIC GROWTHS.

smooth elevations, corresponding to the presence of loculi in the interior of the cyst. Over these elevations the surface appears thin and translucent; elsewhere it is thick, opaque, and of a dead white colour; sometimes it is a shiny bluish-grey. Numerous blood-vessels may be seen shining through the smooth outer wall and passing to the pedicle.

The cut surface of the cyst shows that the tumour is made up of a number of loculi of varying size separated from one another by fibrous-tissue septa. Attached to the wall of each loculus, clusters of smaller cysts may be seen (Figs. 142, 143).

Usually a few loculi are very much larger in size than the remainder, and an examination of their inner wall reveals the presence of fibrous strands. It is probable, therefore, that these larger loculi are produced either by rupture of the walls of the smaller cysts, so that loculi originally separated come to communicate with one another, or owing to the tension the tissues separating two cysts may undergo pressure atrophy, with consequent absorption of tissues separating the smaller cystic spaces. This process may proceed to an extreme degree, so that the tumour becomes unilocular.

The content of the cysts varies; usually it is a clear watery fluid, with a specific gravity of 1010 to 1030, containing albumin and

Fig. 143.—Portion of a Multilocular Ovarian Cyst.

pseudo-mucin, a body which differs from mucin in that it is not precipitated from a watery solution by acetic acid. It is sometimes of a very ropy nature. These characters are more usually found in the larger cysts; in the smaller the fluid is more viscid. Sometimes it is so thick and viscid that it will not drain through a trocar after the cyst wall is punctured. The colour depends upon the amount of admixture of blood-pigment: usually it is straw colour, but it may be yellow, green, dark brown or red. Cell elements are frequently present; they are shed epithelial cells, and may be so numerous as to give the fluid a milky appearance.

Microscopic Section.—The wall of the tumour shows that it is composed mainly of fibrous tissue, the outer layers of which are dense, the inner more loosely arranged, cellular, and vascular. There is a lining membrane composed of tall columnar epithelium, the nuclei are rounded and situated near the base of each cell, while the remainder of the cell is clear and contains the pseudo-mucin. The cells may appear cubical or flattened, the result of pressure; goblet cells are not infrequently present (Figs. 144, 145).

The epithelium is usually arranged in a single layer, but occasionally papillary processes project into the cyst cavity. This has been more often observed in cysts composed of several loculi of

Fig. 144.—Multilocular Ovarian Cyst: Cystic Adenoma.
Spaces lined by long columnar epithelium.

equal size. These papillæ arise from a rapid heaping up of the lining epithelium, which subsequently becomes invaded by connective tissue and vascularized. The papillæ so formed are thready branching processes, covered by a layer of cylindrical cells and containing a central stroma of fine connective tissue. Tumours containing these papillæ have been described as "papillary pseudo-mucinous cysts."

The term grape-like cyst or racemose cyst has been applied to a variety of pseudo-mucinous cysts which occasionally occurs, in which the tumour is composed of a number of pedunculated cysts attached by narrow pedicles to the ovary (Fig. 146).

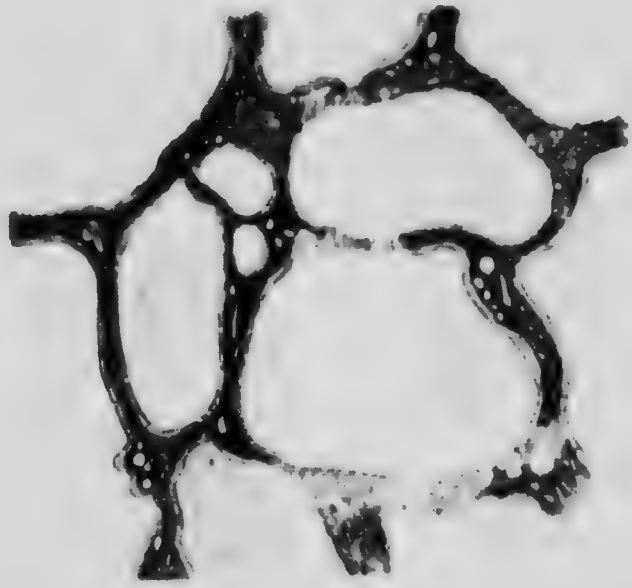


FIG. 145.—OVARIAN ADENOMA: MULTILOCULAR OVARIAN CYST (LOW POWER).

FIG. 146.—CLUSTER CYST OF THE OVARY, SHOWING TORSION OF THE STALK OF ONE PART OF THE CLUSTER.

Pseudo-mucinous cysts may occur at any age, but are rare before puberty. They have been found present in the abdomen of a woman of the age of ninety, and obstructed labour has followed from their presence within the foetus. They tend to grow rapidly, and may attain to a very large size in the space of a few months. A sudden increase in the size of the cyst may be due, not only to growth, but to a sudden intracystic hæmorrhage or to malignant change.

Epithelial Infection.—This interesting phenomenon has been observed occasionally in connection with pseudo-mucinous cysts. Owing to the rupture of the cyst, portions of the epithelial contents may escape and become implanted upon the peritoneum, the opposite ovary, or the raw surface of a wound, where they continue to grow. These secondary deposits are not always malignant in nature, they do not invade the surrounding tissues, they persist only as surface growths, and they may disappear spontaneously.

During their life the epithelial deposits may continue to form new cysts and to produce pseudo-mucin, which sometimes escapes into the abdominal cavity in large masses. In association with the presence of these pseudo-mucinous masses, the peritoneum may show evidences of chronic inflammation with great thickening of it and the omentum. This condition is known as "pseudo-myxoma peritonei"; it is usually associated with ovarian cysts, but cases have been recorded following mucous cysts of the vermiform appendix, some of them in males.

It is not certain that cysts which behave in this way are really pseudo-mucinous cysts, for they differ slightly in their general appearance, possess a thinner wall, and microscopically appear almost structureless. It has been suggested that they are carcinomata of the ovary undergoing colloid change.

(*b*) **Papillomatous Cysts.**—It was mentioned in the description of the multilocular pseudo-mucinous cysts that occasionally the lining epithelium may be thrown up into proliferating folds. The border-line between such a growth and the true papillomata of the ovary is thus ill-defined, but most observers regard them as essentially different: for whereas in the multilocular cyst the papillary mass is small and only occurs in a few isolated loculi, in the papillomata these overgrowths of epithelium are the characteristic feature, and the contents of the cyst are thin, clear, and watery, and do not contain pseudo-mucin.

Ovarian papilloma may be divided into two groups:

1. Cysts with intracystic papilloma.
2. Surface papilloma.

Of the two, the intracystic variety is that more commonly met with; the surface papillomata are rare. The two forms may coexist in the same tumour, and it is possible that the surface forms may really represent, not a new type of cyst, but one in which intracystic growths have ruptured their containing wall and so become surface growths (Fig. 147).

Intracystic Papilloma.—These cysts rarely attain to so large a size as the pseudo-mucinous cysts, and usually they are no larger than the fœtal head; they are commonly bilateral, and are often associated with the presence of free fluid in the abdominal cavity. They may possess a pedicle, but tend to burrow between the layers

Fig. 147.—Papilloma of the Ovary, showing Surface and Intracystic Papillomata.

of the broad ligament, and occasionally strip up the peritoneum of the pelvic floor and posterior wall of the abdomen. On opening the tumour, it is found to consist usually of several loculi of varying size. Within the loculus is a clear watery fluid of low specific gravity, 1005 to 1010, sometimes stained by blood-pigment; it contains some albumin, but no pseudo-mucin. Epithelial cells, cholesterin, and hæmatoidin crystals, may be present. Attached to the inner wall of the loculus, and projecting into its cavity, are papillomatous processes which may be so large and numerous that they almost completely fill the loculus. They are attached to the cyst wall by pedicles, some thin, some broad and short.

Microscopic Section.—Traces of ovarian tissue may be found in the cyst wall if the tumour is small; in others the wall in its outer part is composed of dense fibrous tissue, sometimes containing some unstriped muscle fibres; internal to this the tissue is looser, more cellular and vascular.

The wall is lined with an inner layer of epithelium. The cells of this epithelium are arranged in a single layer; they are usually cubical or columnar.

The papillary processes are long and feathery; they are covered by an epithelium of similar type to that lining the cyst walls, but the cells show a tendency to proliferate and to form more than one

Fig. 148.—Papillomatous Ovarian Cyst (Low Power).

layer. The core of the papillary process is composed of a loose vascular connective tissue. Psammoma bodies are a feature of these cysts. They occur in both the epithelium and connective-tissue cells, and consist of concentrically arranged particles of calcareous matter (carbonate and phosphate of calcium). In the process of their formation a cell swells, its contents undergo fluid degeneration, and the nucleus disappears. Several adjacent cells undergo a similar change at the same time and become fixed together, and the calcareous material is deposited in the mass in a concentric manner (Fig. 148).

Surface Papilloma.—The papillomatous growths may occur in patches upon the surface or cover it almost entirely; they may be

flat and sessile, or may possess a well-marked pedicle. The interior of the ovary may show little change, but as a rule it is cystic and some papillary processes are found within the cyst. Projections from the surface epithelium may pass into the ovarian stroma and produce ducts lined by a columnar epithelium.

Ovarian papillomata are not such common tumours as the pseudo-mucinous cysts; the ratio between the two has been stated as being 1 to 10. They are associated with ascites as a rule, and have a marked tendency to burrow beneath the peritoneum. Sometimes the tendency to burrow is extremely marked. The border-line between an innocent ovarian papilloma and carcinoma is but ill-defined.

Fig. 149.—Papillomatous Ovarian Cyst: Malignant (High Power).

As long as the papillomatous masses remain confined within the cyst, the tendency is to remain innocent; but should they emerge upon the surface from rupture, from growth, or from degeneration of the cyst wall, the masses may become implanted upon the peritoneum in any part of the abdominal cavity. It is not always possible to determine whether these cysts are innocent or malignant except by a microscopic examination of the nature of the epithelium (Fig. 149).

It must be remembered, however, that the presence of implantation growths about the peritoneal cavity is not necessarily evidence of malignancy. They have been known to disappear completely upon the removal of the original cyst, which may be regarded as their source, and, as long as it is present, scatters fresh buds around.

EMBRYOMA.

Definition.

The terms embryomata or teratomata are applied to tumours of great interest, which are composed of tissues of many various types, such as skin, muscle, cartilage, and glands. Sometimes these tissues are arranged in such a manner that they resemble the mature organs of the body, and occasionally well-formed limbs and an almost complete embryo may be found within the growth.

Embryomata may occur in various portions of the body; they are usually met with in the ovary and the testicle, more commonly in the ovary.

The origin of these extraordinary tumours will be considered under the origin of ovarian tumours (p. 446).

Varieties.

Two groups of these tumours may be described:

1. Cystic embryoma.
2. Solid embryoma.

It must be understood, however, that the division between the two groups fades away gradually; the cysts may contain solid portions, and within the solid growths cystic spaces are sometimes present.

Cystic Embryoma in the Ovary.—For a considerable period of time the name "dermoid cyst" has been applied to these tumours. The name "dermoid" is given to tumours occurring elsewhere in the body which are lined by skin, and arise from the inclusion of ectodermal structures only. It is true that within the cystic embryoma skin may be found, but a careful microscopic examination reveals also the presence of other tissues of mesoblastic or hypoblastic nature in varying amounts. Cystic embryomata occur at all ages; they are more common during the child-bearing period of life, but they have been found in the aged and also within the fœtus. They are usually unilateral, but may be bilateral. The remainder of the ovary may project as a small nodule on the surface of the cyst, or may be indistinguishable except on microscopic section.

The tumour is usually pedunculated. More rarely the cyst burrows beneath the peritoneum of the broad ligament. They vary greatly in size. Commonly about that of a cricket-ball, they may assume enormous proportions, so that cystic teratomata weighing about 35 pounds have been recorded. In shape they are rounded or oval. The external wall is smooth and of a yellow dead-white colour.

Adhesions between it and the intestines are commonly seen. On cutting open these cysts, they are usually unilocular, but occasionally there may be more than one loculus. In some instances a teratomatous cyst has been found within a multilocular pseudomucinous cyst or a papillomatous cyst. It is probable that this occurrence is caused by the simultaneous presence in the same ovary of two different cystic formations, and that the more slowly growing teratomatous cyst has been enveloped and surrounded by the more quickly growing adenomatous type of cyst.

The cyst contains thick greasy, yellowish sebaceous material composed of fatty globules, cholesterin, and broken-down cells (Fig. 150).

FIG. 150.—OVARIAN EMBRYOMA, SHOWING HAIRS.

Enmeshed in this and forming a sticky mass are hairs. These are all of the same colour; they are as a rule long, and may be as much as 4 feet in length. Occasionally, on opening the cyst, numbers of small globules may be seen. It is stated that these consist of firm sebaceous material wrapped around a central nucleus of hair and epithelial cells; but this central nucleus can rarely be demonstrated. Generally they are composed only of fat. The fluid within the cyst is thin and watery in these cases. Several hundred of such balls may exist in the tumour. An examination of the inner wall of the cyst reveals two portions: (*a*) the cyst wall; (*b*) a rounded protuberance—the embryonal rudiment.

The cyst wall is composed of connective tissue and the remains of the ovary (Figs. 151, 152); ovarian stroma cells, Graafian follicles,

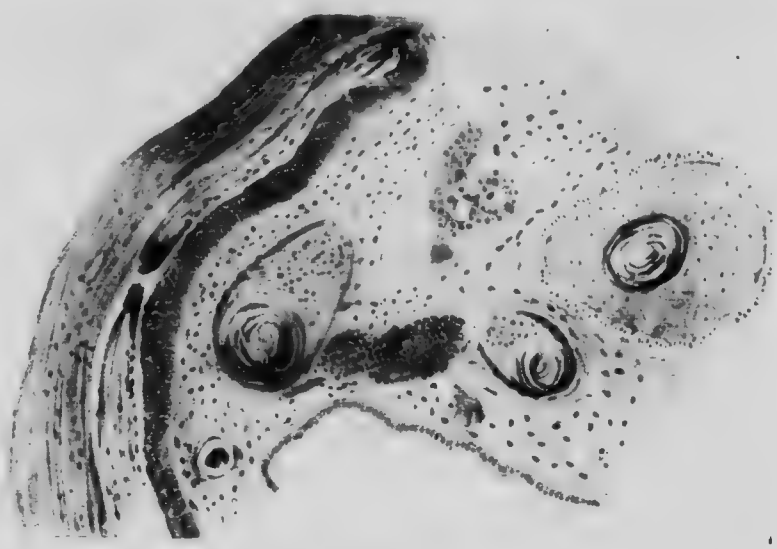


FIG. 151.—EMBRYOMA OF OVARY: EPITHELIAL PEARLS AND GLAND-LIKE SPACE

FIG. 152.—EMBRYOMATOUS CYST OF OVARY.

Note the lining of epidermis with a sebaceous gland opening upon it.

and corpora lutea, can usually be distinguished. In the neighbourhood of the embryonal rudiment the cavity is lined by skin;

FIG. 153.—EMBRYOMA IN A MUTILOCULAR OVARIAN CYST.

FIG. 154.—OVARIAN EMBRYOMA, SHOWING TEETH.

elsewhere the lining consists of fibrous tissue, to which the hairs may be attached, and around the ends of the hairs, as they project into the granulation tissue, the presence of giant cells is not uncommon.

The Embryonal Rudiment.—At one area in the cyst wall a small warty protuberance as a rule projects into the cyst cavity. This is the embryonal rudiment; it is covered by skin, and the hairs grow from this spot. Sometimes this area is small and flattened; it may be unrecognizable except by microscopic examination; on the other hand, all gradations from a small projection even to a definite embryo with limbs may be seen. It is not clear whether the cystic portion is the result of the presence of this embryonal area, or whether the area itself is produced by the cystic growth (Fig. 158). Examination of the rudiment shows any of the following tissues (Figs. 154, 155, 156):

(*a*) *Derived from Epiblast.*—The skin resembles that of the body surface, but the papillæ are flatter, and touch corpuscles are absent. The hairs arise from the skin surface. Sebaceous glands are well marked, and are present in large quantities; it is from them that the sebaceous contents of the cyst are derived. Teeth occur in about 50 per cent. of the cysts—usually few in number, but there may be several hundreds present. As a rule they resemble canines, and have only one root; they are composed of enamel, dentine, and nerve pulp, and occasionally they are found embedded in plates of bone.

Nails and mammary structures occur sometimes. Nervous structures may be found, such as a reticulated neuroglia containing nerve cells and nerve fibres, neuroglial tissue with a central canal lined by ciliated epithelium, and choroidal and retinal tissues.

(*b*) *Derived from Mesoblast.*—Bone is present in most cysts, usually as a flattened plate, but structures resembling long bones do occur. Cartilage is not uncommon. Unstriped muscle and connective tissue are occasionally present. Bloodvessels have been demonstrated.

(*c*) *Derived from Hypoblast.*—Hypoblastic structures occur but rarely. Structures resembling the mucous membrane of the intestinal canal, the trachea, and the thyroid, have been demonstrated.

Embryomatous cysts may rupture either from injury or from degeneration of the cyst wall, which may be adherent to neighbouring structures. The contents then become scattered over the abdominal cavity. The cyst contents are sterile as a rule, but they may be infected. In some cases small portions of the tumour

FIG. 155.—OVARIAN EMBRYOMA, SHOWING TEETH.

FIG. 156.—OVARIAN EMBRYOMA.

become implanted upon the peritoneum and viscera, where they grow and reproduce the original tumour. These masses are not necessarily malignant; they do not tend to invade the surrounding tissues.

Cystic embryomata, however, may occasionally exhibit malignant characters (see p. 448).

Solid Embryoma.—This variety is of an intensely malignant nature, and is discussed on p. 448.

CHAPTER LI

TUMOURS OF THE OVARY—*Continued*

TUMOURS OF CONNECTIVE-TISSUE ORIGIN.

Fibroma.—While most solid tumours of the ovary are of malignant nature, a certain proportion of them are composed of fibrous tissue, and are innocent (Figs. 157, 158, 168).

It is stated that 2 per cent. of all ovarian tumours are of this type. Ovarian fibromata occur over a wide period of life; cases as young as eight and over seventy years of age have been recorded.

Unlike other ovarian new growths, these tumours as a rule grow slowly; in one instance a tumour of this nature required four years to increase from the size of a hen's egg to that of a man's head. Three varieties of ovarian fibroma may be described:

1. In this group we do not find an enlargement of the whole ovary, but a solid tumour composed of connective tissue arising within the ovary, so that it has on its outer surface a variable quantity of ovarian tissue as a separate, distinct, and easily recognizable structure. In some cases the tumour can be separated, and enucleated from this bed of ovarian tissue. It is innocent in nature.

2. In this group the ovary is entirely replaced by the new formation. The tumour is found in the position of the ovary; it usually possesses a pedicle, and but rarely tends to burrow between the layers of the broad ligament or beneath the pelvic peritoneum. The growth is sometimes bilateral, in which case one tumour is of considerably larger size than the other. Possibly some of these bilateral cases are really malignant.

The consistence is firm, unless degeneration has taken place. The size of the mass shows marked variation: in some cases it is no larger than a golf-ball; in others it almost fills the abdominal cavity.

The shape tends to reproduce that of the original ovary. The outer surface is of a dead-white colour and smooth: it may be covered with smooth rounded elevations. It is a striking fact that the

abdominal cavity is frequently found to contain free fluid, although this is a rare accompaniment of fibroids of the uterus. Free fluid may be present also within the pleura.

On cutting open the mass, it is firm and resistant. The cut surface is white and shows interlacing bundles of fibrous tissue. Under the microscope the tumour is found to consist of strands of fibrous tissue, some cut in transverse and others in longitudinal section, between which lie spindle cells identical with the cells of

Fig. 157.—Fibroma of the Ovary.

the ovarian stroma (Fig. 160). The amount of the cellular tissue varies. The blood-supply is not abundant, but a certain number of capillary spaces lined by endothelium occur. These possess no definite fibro-muscular wall, but around them the fibrous tissue is often arranged in a concentric manner (Fig. 159).

Fibromata of the ovary are liable to undergo degenerative changes. Œdematous infiltration and myxomatous softening, leading to the formation of cystic cavities, are not uncommon; deposition of calcareous material has been described (Figs. 161, 162).

FIG. 158.—FIBROMA OF THE OVARY.

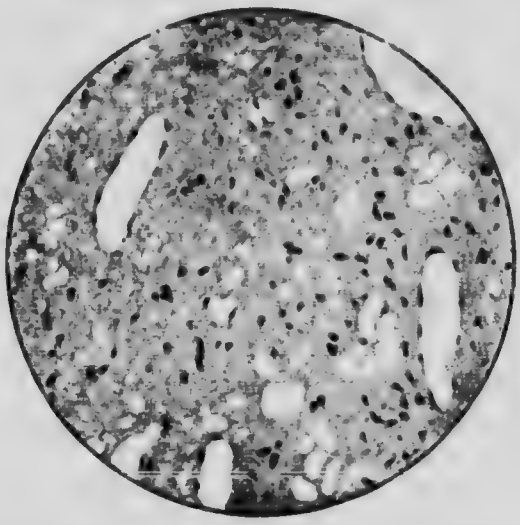


FIG. 159.—SOFT FIBROMA OF OVARY: LOOSE CONNECTIVE TISSUE, HIGHLY VASCULAR (LOW POWER).

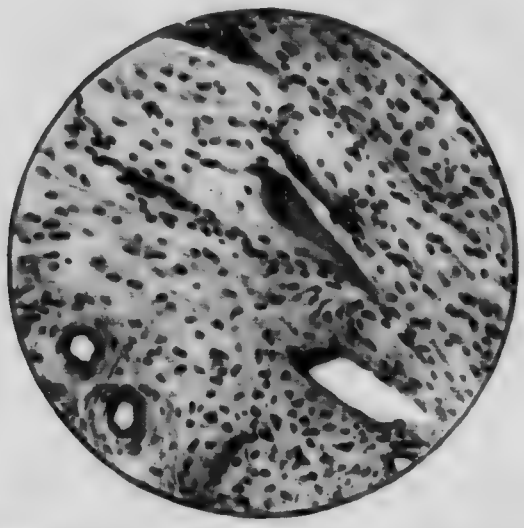


Fig. 160.—Fibroma of Ovary. Much Fibrous Tissue, Scanty Cell Elements (Low Power).

Fig. 161.—Fibroma of the Ovary, showing Cystic Degeneration.

FIG. 162.—FIBROMA OF THE OVARY, SHOWING MUCOID DEGENERATION

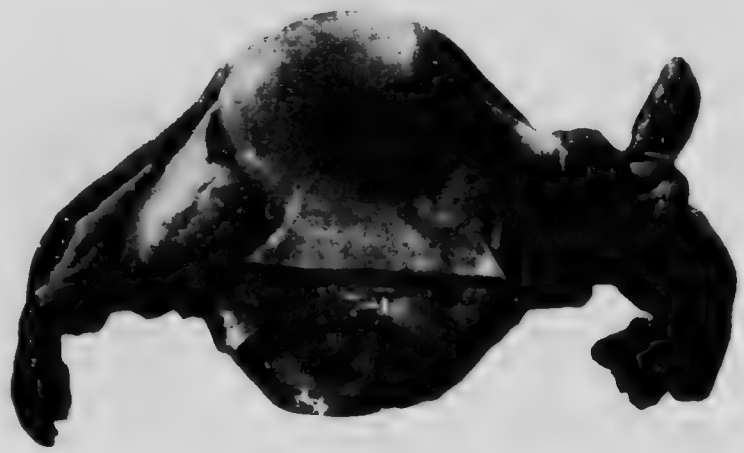


FIG. 163.—FIBROMA OF THE OVARY.

It is usual to mention in connection with this variety a form of tumour in which the growth is composed of cells which cannot be distinguished from those of the normal ovarian stroma.

Strictly speaking these are not fibromata, but are overgrowths of the stroma cells, and the term stromomata has been applied to them. While in many instances they are of innocent nature, yet they are not infrequently followed by recurrence. It is difficult, therefore, to be certain whether these growths are innocent or malignant, for it will be remembered that the ovarian stroma is composed of round and spindle cells of embryonic type. It is probable that some growths described under this title are in reality sarcomata.

3. This constitutes but a rare variety; the growth occurs as a small pedunculated tumour attached to the surface of the ovary. The mass is usually about the size of a walnut; its surface may be smooth or lobulated.

It arises in connection with the tunica albuginea in some cases, in others from the substance of the ovary.

Fibromyoma.—Such tumours occur but rarely in connection with the ovary. It is probable that they really arise from the ovarian ligament rather than from the ovary itself.

MIXED CONNECTIVE TISSUE AND EPITHELIAL TUMOURS.

Adeno-fibroma.—These are rare tumours composed for the most part of loosely arranged fibrous tissue, and containing cystic spaces of varying size. These acini are lined by an epithelium of cubical cells which may undergo colloid change, and may occasionally proliferate and invade the surrounding tissues and assume a malignant nature. Whether these tumours are really ever malignant is doubtful. They are usually of small size, and may represent adenomata which [illegible] not yet cystic.

BROAD LIGAMENT CYSTS.

This term is applied to a number of cystic formations which are found between the two layers of the broad ligament or in connection with it. They are derived from the fimbria ovarica of the Fallopian tube, the paroöphoron, epoöphoron, Kobelt's tubes, the hydatid of Morgagni, or from accessory Fallopian tubes.

Fimbrial Cysts.—Recent research has demonstrated that the only broad ligament cysts which attain to a large size, and are of clinical importance, arise from fragments of the ovary in the fimbria ovarica. The term parovarian should not be applied, as is customary, to these cysts, but should be reserved for those cysts which arise from the paroöphoron and the structures mentioned above.

Fimbrial cysts are situated between the abdominal end of the tube and the ovary. As they enlarge they tend to spread into the mesosalpinx and between the layers of the broad ligament. They may possess a pedicle, but they do so less commonly than ovarian

FIG. 164.—FIMBRIAL CYST, SHOWING FALLOPIAN TUBE STRETCHED OVER THE CYST.

cysts, and the pedicle is broader and less distinct. Sometimes the cyst burrows deeply beneath the peritoneum of the pelvic floor and abdominal wall.

Its relation with the Fallopian tube is a characteristic feature; the tube and the fimbria ovarica are elongated, and are stretched over the top of the cyst. The remains of the fimbriated ends of the tubes are frequently distinguishable: one of these fimbriæ—*i.e.*, the ovarian fimbria—may be traced on to the ovary, which may be seen on the lower aspect of the cyst, sometimes separate and distinct, at others fused and flattened out with the cyst wall. In size these tumours show marked variation. Usually no larger than a hen's egg, they have been known to reach an enormous size, and almost to fill the abdominal cavity (Fig. 164).

In appearance the outer wall is smooth, thin, and translucent;

and it is covered by peritoneum, which is only loosely attached to it. The cyst is usually unilocular, the lining wall is smooth; small warty protuberances are not uncommonly found scattered over it, and occasionally these may reach a considerable size. In some rare instances definite papillary masses with slender branching processes may exist.

The cyst contains a clear, watery, almost colourless fluid, of low specific gravity, usually about 1005; it is slightly alkaline, and contains a small amount of albumin, sometimes pseudo-mucin also. Occasionally the contents resemble those found in the multilocular ovarian cyst.

FIG. 165.—BROAD LIGAMENT CYST.
In the Fallopian tube is an extra-uterine gestation.

On microscopic section, the outer wall is seen to be made up of a loosely arranged connective tissue, within which unstriped muscle fibres occasionally are present. The lining wall consists of a single layer of columnar epithelium, situated upon a basement membrane.

Parovarian Cysts.—This name should, strictly speaking, be applied only to cysts which have arisen from the parovarium. This structure consists of a duct (the duct of Gartner) lying between the layers of the broad ligament, and a short distance beneath the

Fallopian tube, with which it runs parallel. The outer end of the duct ends blindly, while it may be traced internally towards the body of the uterus and occasionally in the wall of the uterus and lateral wall of the vagina. Three sets of vertical tubes pass from it towards the ovary: the outer set (Kobelt's tubes) ends blindly and does not reach the ovary; the middle set (or paroöphoron) can be traced as far as the hilum of the ovary, and it is claimed that they can be traced into the surface-substance of the hilum; the inner set consist of four short tubules and is known as the epoöphoron. The true parovarian cysts may arise from any of these tubes, more commonly in connection with the vertical tubes

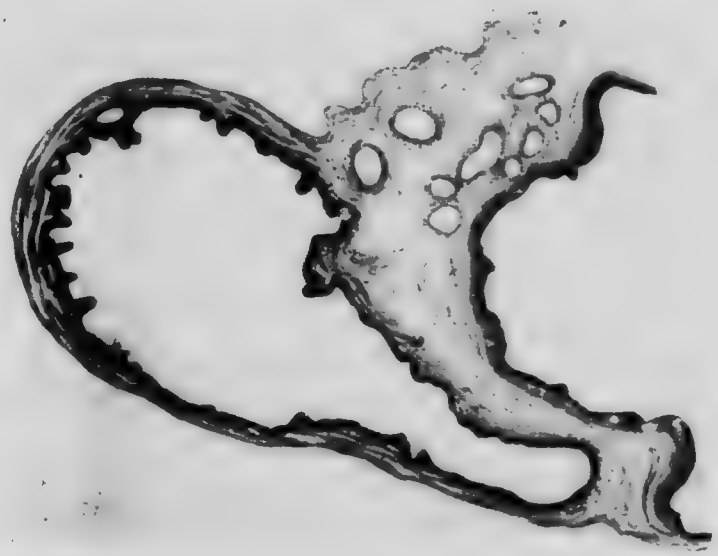


Fig. 166.—Dilated Parovarian Tubules: Lining of Short Columnar Epithelium.

and the duct. They are situated between the layers of the broad ligament, the Fallopian tube passes over them, and the ovary can usually be seen separately (Fig. 165).

The cyst is usually small, rarely larger than a hen's egg. The wall is thin and translucent; on opening the cyst, a clear watery fluid escapes, of low specific gravity, containing albumin and sometimes a Fehling-reducing substance.

On *microscopic section* the wall is seen to be made up of an outer connective-tissue covering, containing bundles of unstriped muscle fibre. The smaller cysts are lined by cubical epithelium, which becomes flattened from pressure as the cyst enlarges (Fig. 166).

Hydrosalpinx of an Accessory Tubal Ostium. — Accessory ostia are of not infrequent occurrence.

On *microscopic section* they are seen to be composed of structures like those of the Fallopian tube. Cysts in the broad ligament may arise as a result of a hydrosalpinx of an accessory Fallopian tube.

Such tumours are rare, and do not usually attain a size larger than a golf-ball. On opening them definite plicæ can be seen on their inner wall, and the cavity of the cyst communicates directly with the lumen of the Fallopian tube.

Cysts of the Hydatid of Morgagni.—These occur commonly as small thin-walled translucent cysts about the size of a pea or cherry,

Fig. 167.—Hydatid Cyst of Morgagni.

with long thin pedicles which are attached to the fimbriated end of the tube. The cyst really represents a modified fimbria. It contains a clear watery fluid, and is composed of a loose connective tissue lined by a single layer of cubical epithelium (Fig. 167).

Lymphatic Cysts.—Small scattered thin-walled cystic bodies lined by endothelial cells are not at all uncommonly seen upon the broad ligament and the Fallopian tube. They are produced by the dilata-

tion of lymphatic spaces, and are of no clinical significance. They are more often found in cases of pelvic inflammation. A cyst of this nature has been figured as large as a golf-ball, although as a rule each cyst resembles a "bleb" 2 to 3 millimetres in diameter.

Differences between Broad Ligament and Ovarian Cysts.—Although broad ligament cysts are not cysts of the ovary, and therefore should not be classified among them, strictly speaking, they form cystic masses in the region of the ovary which, clinically, may so closely resemble true ovarian tumours that it is usual to consider them together and to include them in the scheme of classification. A differential diagnosis may not be possible in many cases, and it is not until the abdomen is opened, and a careful examination is made of the relations of the cyst, that its true nature can be determined.

Certain differences can be enumerated as follows:

Broad ligament cysts are more slowly growing tumours; they tend to displace the body of the uterus and cervix laterally, sometimes upwards; they are situated at a lower level in the pelvis, and may obliterate the vaginal fornix; as they grow they expand the broad ligament, and may cause lengthening of the uterine body; they are enveloped by peritoneum which covers them loosely; the Fallopian tubes lie stretched over the top of the cyst, and the ovary may be independent of the tumour.

The mobility of these tumours is also usually restricted unless the cyst is placed at the outer free extremity of the broad ligament. It must be remembered that a small ovarian cyst may also be fixed as a result of inflammatory adhesions or from malignant growth.

TUBO-OVARIAN CYSTS.

This condition is brought about by the communication of a dilated Fallopian tube and a cystic ovary. The tube in these cases is sometimes distended by clear watery fluid (hydrosalpinx), occasionally by pus (pyosalpinx). The form of ovarian cyst found is usually the distended ovarian follicle.

The two structures, already in close apposition, press upon one another as they enlarge, and inflammatory adhesions may connect the two. Later by absorption, either as the result of pressure atrophy or degeneration, one single cyst cavity results. The communication between the two structures may be a wide one; sometimes it is narrow and will only admit a probe; this probably represents an early stage in the process of communication (Fig. 168).

Specimens have been described as tubo-ovarian cysts in which

a tortuous hydrosalpinx has overlapped and concealed the ovary. These are not true tubo-ovarian cysts, for no opening can be established between the distended tube and the ovary, nor is the ovary cystic.

The Pedicle of an Ovarian Tumour.—This consists of the two folds of peritoneum of the broad ligament containing the ovarian artery and veins, the Fallopian tube, and the parovarium, together with the ovarian ligament at the inner side and the ovariopelvic ligament at the outer side. It varies greatly in length, being sometimes so short that the ovarian tumour may almost be said to be sessile, is usually about 1½ inches long and sometimes reaches the length of

FIG. 168.—ONE HALF OF A DILATED FALLOPIAN TUBE AND A SMALL UNILOCULAR CYST OF THE OVARY.

The extremity of the tube has become adherent to the cyst, and communicates by an orifice in which a small rod has been placed.

6 or 8 inches. A short pedicle is usually a broad one, while a long one is often narrow. On the right side the pedicle if short and broad may encroach on the cæcum, while on the left side it may encroach on the mesosigmoid. In normal conditions its thickness from back to front is simply that of the upper part of the broad ligament but in the case of an infected tumour its thickness may be much increased by infiltration and œdema.

When the pedicle is long and the tumour not too large, the ovary may be mistaken, from its mobility and position, for a tumour of the kidney or a hydronephrosis. Torsion of the pedicle is not uncommon, and may lead to serious symptoms, which will be found described in the section devoted to clinical history.

CHAPTER LII

TUMOURS OF THE OVARY—*Continued*

MALIGNANT TUMOURS.

MALIGNANT new growths of the ovary occur in different forms and varieties. They may be primarily malignant, or a tumour at first innocent may at a later date show malignant characters, or they may be secondary to a growth elsewhere in the body.

These growths may arise from epithelial or connective tissue, but tumours have been discovered containing a mixture of both types.

Carcinoma.

(a) Primary Solid Carcinoma.

Solid carcinomata of the ovary are somewhat rare tumours. They are stated to occur in about 5 per cent. of all the new growths of the ovary. In a series of 720 ovarian tumours, 147 were malignant; a careful microscopic examination was made in 112 cases, and showed that of these 35 were solid carcinomata, 60 cystic carcinomata, and 27 sarcomata.

They may be met with at all ages, but are most frequently met with during the child-bearing period of life. The growths occur equally amongst the married and the unmarried. It is rare for the pregnancy and the cancer to coincide, but in most cases in which this has happened the pregnancy has followed a normal course.

The tumours may be unilateral or bilateral. If bilateral, it is improbable that they are so from the first. The other ovary is involved subsequently, for, in many cases in which the second ovary looks normal to the naked eye, a more minute investigation under the microscope has shown it to be invaded by malignant cells. Certainly by the time the patient comes up for treatment, these tumours are generally found on both sides. Probably the explanation is that direct spread takes place from contact with the growth in the first ovary, or by peritoneal infection. It has been demonstrated that the second ovary may be invaded from the primary growth by the spread of malignant cells along the mucosa and the lymphatics of the Fallopian tube.

The tumour may be found between the layers of the broad ligament, but this is rare. Torsion of the pedicle is rare, probably on account of the uneven surface of the tumour, or from adhesions which are, either inflammatory or neoplastic in nature, frequently seen connecting the mass with both small and large intestine, great omentum, peritoneum, and the uterus or bladder.

The size shows marked variations, sometimes little larger than the normal ovary; the mass may occasionally completely fill and distend the abdomen. Usually it does not attain to a size larger

FIG. 169.—CARCINOMA OF THE OVARY.

than that of a man's head. When the tumours are bilateral they are rarely of equal dimensions. A tumour weighing as much as 14 lbs. has been recorded.

Solid carcinomata are rounded growths, and the surface is usually smooth in outline, though at times it is irregular and covered with bosses, corresponding with solid or cystic elevations of the growth. The colour is usually white; sometimes it is slightly yellow or tinged with red. This will depend upon the thickness of the capsule and the presence of blood-pigment due to hæmorrhages, which are not uncommon, both into the solid and cystic portions of the tumour. In consistence the growths are firm as a rule (scirrhus type), but they may feel soft and almost brain-like (encephaloid type). The consistence may vary in different parts of the same tumour, and

depends upon the amount of connective tissue and upon the presence of œdema or cystic degeneration (Figs. 169, 170, 171).

On cutting into the tumour, it will be seen to possess a white fibrous capsule about a quarter of an inch in thickness, which is usually adherent on its outer aspect, and on its inner aspect is attached to the growth proper; in places it may be ruptured. The cut surface is sometimes firm and solid, at others soft and degenerate, and the degeneration may be so marked as to produce cystic spaces. These necrotic areas form a marked feature of such growths. Some of these spaces have no definite wall, the outline consisting only of

Fig. 170. Encephaloid Carcinoma of the Ovary.

broken-down tissue; others, less numerous and of smaller size, are lined by epithelium. These areas differ in colour according to the amount of pigmentation from extravasated blood (Fig. 172).

Microscopic Examination.—The microscopic structure of primary solid carcinoma of the ovary shows marked variations in type, and may in this respect be compared to the malignant growths of the testicle. The following varieties have been described: (1) glandular; (2) diffuse; (3) clear-celled.

1. *Glandular.*—This, in which the cells are grouped together in large masses, is the commonest variety of primary solid carcinoma of the ovary. The carcinomatous tissue occurs as definite solid masses of cells arranged in branching columns, lying in spaces enclosed by strands of connective tissue.

These masses are sometimes solid, sometimes arranged in the form of hollow tubes. The cells are polygonal in shape; the connective tissue around them may be scanty or dense (Fig 173). It has a

FIG. 171.—CARCINOMA OF THE OVARY, DEGENERATING.

FIG. 172.—COLLOID CARCINOMA OF OVARY. CONNECTIVE-TISSUE STROMA; SPACES FILLED WITH COLLOID SUBSTANCE AND EPITHELIAL REMAINS.

MICROCOPY RESOLUTION TEST CHART

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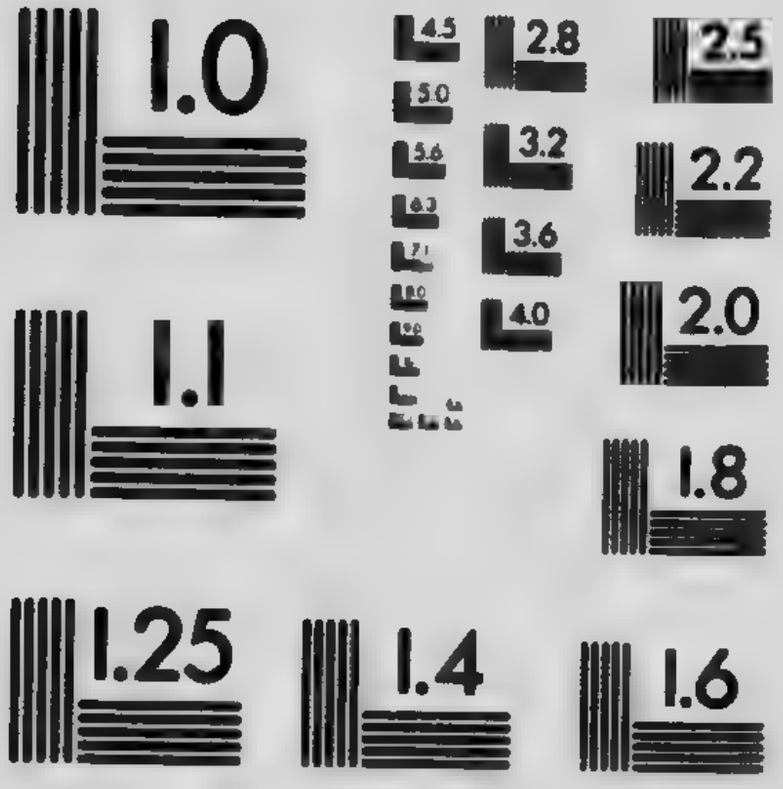

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marked tendency to undergo degeneration, myxomatous areas, areas of necrosis and of hæmorrhage, being frequently observed. Proliferation of the connective-tissue cells is by no means uncommon, so that it is not always easy to distinguish this type of growth from the combined carcinoma and sarcoma variety.

Within these tumours ova-like structures have not infrequently been demonstrated, which has led to the assumption that the tumours have arisen from Graafian follicles. This view as to their origin is incorrect; for these structures, in all probability, represent areas of degenerate cells. See the origin of ovarian tumours (p. 446).

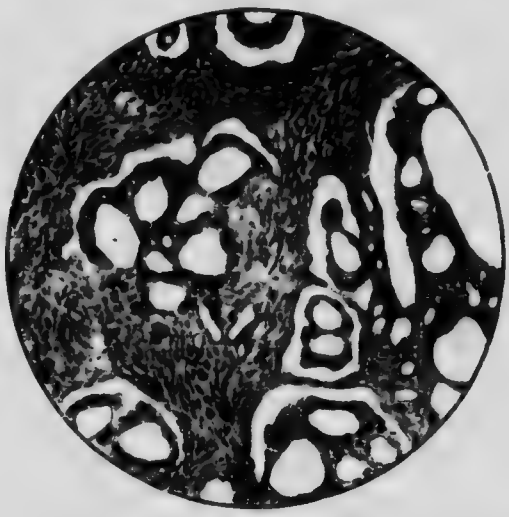


FIG. 173.—COLUMNAR-CELLED CARCINOMA OF OVARY (HIGH POWER).

2. *Diffuse Type.*—This variety occurs less commonly than the preceding, and in it the cancer cells are found scattered indiscriminately among the connective-tissue strands. The cells are similar in shape to those found in the glandular form: they occur as isolated units or collected into small masses. Both the glandular and the diffuse variety may be present in different parts of the same specimen.

3. *Clear-Celled.*—The carcinoma cells are arranged in a glandular manner, but are of unusually large size, and possess a clear protoplasm in which may be many vesicles containing glycogen.

Similar cells have been observed in growths of the testicle, and in carcinoma occurring in the stomach, breast, and kidney. This variety is classed by some in the glandular group; according to others it is really a secondary growth from carcinoma of the stomach (leather-bottle stomach).

Dissemination of Ovarian Carcinoma.—(*a*) The peritoneum may be involved by the implantation upon it of cancer cells, liberated and scattered into the peritoneal cavity from the primary growth. (*b*) The growth may spread, as the result of direct contact between it and neighbouring structures. (*c*) It may spread by lymphatic involvement, the glands involved being those in the lumbar and renal regions. Owing to the anastomosis between the lymphatics of the ovary and of the uterus, the iliac and pelvic glands may be similarly affected. (*d*) Reference has already been made to the spread along the Fallopian tube. Isolated masses of malignant cells have been demonstrated lying loose in the lumen of the tube, between the plicæ and beneath the mucous membrane. In some of these cases small deposits have been observed also within the body of the uterus, and it is believed that these represent metastases from the original tumour.

The tissues involved in order of frequency are: the parietal peritoneum, great omentum, intestine, liver, and uterus.

Ascites accompanies these growths in about 50 per cent. of the cases; the amount varies from a few ounces to several pints, and the free fluid may be present with or without involvement of the peritoneum. In appearance the fluid is straw coloured, but may be blood-stained: it frequently contains epithelial cells and leucocytes. There is nothing characteristic of malignancy in the nature of the fluid. Cells may occur, but they really represent clumps of endothelium.

(*b*) *Primary Cystic Carcinoma.*

Carcinoma may occur in tumours which, though originally innocent, have assumed malignant characteristics. This form is found in connection with the adenomatous group—*i.e.*, the pseudomucinous cysts and the papillomatous cysts. The contents of the loculi may resemble those of the innocent tumour, but usually the fluid contains large quantities of epithelial cells and is blood-stained. The cells vary in size and shape; they show a marked tendency to proliferate both into the cyst cavity and beyond the basement membrane. So great may be the proliferation into the loculi that they sometimes appear packed with cells, so that on section the loculi are almost solid. Carcinoma of the papillomatous cyst type (papillary columnar-celled carcinoma) is one of the commonest varieties of ovarian malignant disease, and it is stated that 50 per cent. of the papillomatous tumours are either originally malignant or become so (see Surface Papillomata, p. 413).

Mere naked-eye examination of an adenomatous cyst is not

always sufficient to differentiate between innocency and malignancy; the change may be gradual, and the malignant characters may be observed only within a limited area. A microscopic investigation of these growths should always be made. The phenomenon of epithelial infection, and its relation to malignant disease in the case of papillomatous cysts, has already been considered.

It is not always possible clinically to tell whether an innocent cyst has undergone malignant change. As a rule this is accompanied by a rapid increase in the size of the tumour and by the presence of ascites.

Secondary growths are found in the omentum, peritoneum, the tubes and uterus, and the opposite ovary. The lymphatic glands involved are those of the iliac and lumbar regions.

Secondary Carcinoma.—While the occurrence of carcinoma of the ovary is rare as a primary growth, it is by no means infrequently met with as a secondary phenomenon to a growth situated either within the stomach, colon, liver, breast, or uterus, of which the intestinal tract is by far the commonest site.

It is often extremely difficult to determine whether the growth is primary or secondary. Frequently the secondary growth forms a large tumour, while the original growth is small and is overlooked, or may be discovered only after a careful post-mortem examination.

The difficulty is further increased by the fact that the secondary growths, when they have attained any size, rarely show reproduction of the cells of the portion of the body originally attacked. It has recently been pointed out that assistance may be gained by staining a portion of the tissue with muci-carmine, which picks out only cells derived from intestinal epithelium.

It is probable that many tumours of the ovary regarded as primary carcinoma really represent secondary deposits. Secondary carcinomatous growths of the ovary are usually bilateral, one ovary being considerably more enlarged than the other, and the histological characters are those of the spheroidal-celled type.

Sarcoma.

Primary sarcomata constitute an exceedingly rare variety of ovarian new growth. They occur most commonly at puberty, but no age is exempt, and a tumour of this nature has been found in the ovary of a seven-months fœtus.

The tumours may be unilateral, but more commonly they are bilateral, and a considerable period may elapse before the second ovary is involved. As a rule they form pedunculated masses rounded

or oval in shape, and not larger than a man's head; but growths weighing as much as 80 to 90 pounds have been described. The surface is smooth or nodular, and a distinct capsule is but rarely seen.

The spindle-celled variety is firm in consistence, but less uniformly so than the fibromata. It is composed of a number of spindle-shaped cells possessing nuclei which vary markedly in shape and form. Passing around and separating the cells are fibrous-

Fig. 174. - Sarcoma in an Ovarian Cyst.

tissue bundles which form a marked feature in a microscopic section of the growth. The spindle-celled variety is less malignant than the round-celled. The growths do not so often recur after removal and they are found in older women (Fig. 175).

The roun :ed variety is a rarer form of tumour. The mass is softer in consistence, and is very vascular. It is composed of masses of small round cells, separated from one another by a fine connective tissue. Large giant cells containing one or more nuclei a·e sometimes seen scattered through the section. Thin-walled bloodvessels and blood-spaces lined by endothelium form a prominent

feature, and areas of degeneration into which hæmorrhage occur are by no means infrequent (Fig. 174).

The round-celled growths are intensely malignant; they tend to recur after removal, and secondary deposits are rapid in onset. The growths are generally met with in early life.

Mixed-celled forms may be found in which both spindle cells, round cells, and giant cells, occur in different parts of the same tumour.

Melanoma may be met with as a secondary deposit within the ovary, but a certain number of cases have been recorded in which the ovary was believed to be the seat of the primary growth.

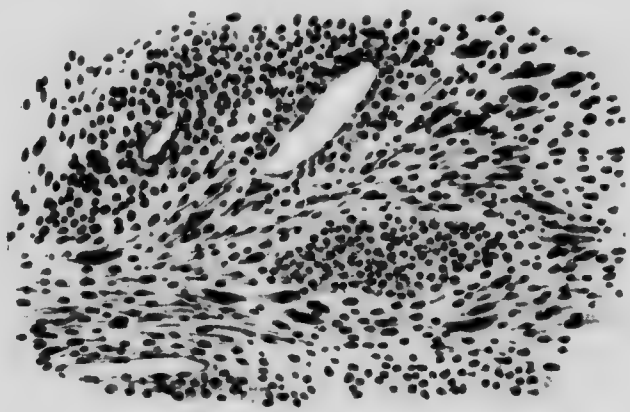


Fig. 175.—Sarcoma of Ovary, Spindle-Celled.

Endothelioma and Perithelioma.—These are rare varieties of sarcoma in which the growth arises in connection with the walls of bloodvessels or lymphatic spaces. In the former the tumour is composed of cells resembling those of the endothelium. In the latter the growth arises from the adventitia of the bloodvessels or from the perivascular lymphatics. Both varieties are intensely malignant, and after removal recurrence or dissemination takes place rapidly.

Combined Carcinoma and Sarcoma.—A few instances have been recorded in which the ovary has been the primary seat of a growth composed not only of carcinomatous but also of sarcomatous tissue. Such tumours grow rapidly and are very malignant. It is not improbable that they are really examples of endothelial proliferation, and therefore they are classed by many observers as endotheliomata.

Malignant Embryoma.

(*a*) Cystic embryomata are usually innocent tumours. A certain number of cases have been observed, however, in which they have shown malignant characters.

The cyst may rupture and give rise to implantation growths resulting from epithelial infection. Secondary growths acquired in this manner are not necessarily malignant, for they do not always invade neighbouring tissue, and do not tend to recur after removal. But quite apart from growths arising from epithelial implantation, cystic embryomata have been found to contain malignant tissue. Thus, the cyst may be invaded by the spread of a growth from neighbouring organs, such as invasion by a columnar-celled carcinoma of the sigmoid; or a carcinoma growing somewhere in the body may give rise to a secondary deposit within the embryoma; two separate growths, innocent and malignant, one a carcinoma and the other a embryoma, may occur simultaneously in the same ovary; and, lastly, a series of cases has been collected showing that squamous-celled carcinoma may originate from the lining wall of a cystic embryoma.

(*b*) Solid embryomata of the ovary occur more rarely than the cystic variety; the usual age is from puberty to young adult life. The abdomen undergoes a painless enlargement; ascites is common even in the early stages. As the growth enlarges it may cause dyspnœa and other symptoms referable to pressure. Menstruation is usually not affected.

Solid embryomata, in striking contrast to the cystic variety are intensely malignant. Secondary deposits occur upon the peritoneum and within the retroperitoneal lymphatic glands. Visceral metastases are met with less often; they have been observed in the liver, lungs, and brain. The secondary masses usually form superficial growths—sometimes as pedunculated processes, at others as flattened masses.

Solid embryomata tend to grow rapidly, and may attain enormous sizes. They are pedunculated, rounded in outline; the outer surface is smooth and may be lobulated. The cut surface is irregular, and usually presents numerous cystic spaces, the inner surfaces of which are rarely smooth, but are irregular and bossed.

Microscopic Section.—The tumour is seen to be composed of fibrous connective tissue, scattered within which are cells and tissues of heterogeneous type, such as bone, cartilage, unstriped muscle, intestine, trachea, and nerve tissues. The cystic spaces are lined by cubical or columnar epithelium, sometimes ciliated; some are

lined by skin containing squamous cells concentrically arranged (epithelial pearls). These tumours are but rarely innocent. This is in striking contrast to the cystic embryomata.

There is a marked tendency to recurrence after removal in cases which showed no clinical or microscopic evidence of malignancy.

Thyroid Tissue.—Tumours composed of tissues resembling that of the thyroid gland are occasionally found within the ovary. The growths are unilateral, and, although usually innocent, may show a malignant nature; for they tend to invade surrounding structures, to recur after removal, and to give rise to secondary deposits in the viscera.

Sometimes the tumour is wholly composed of the thyroid-like tissue; at others it is found as small isolated masses within the wall of a cystic teratoma or in a pseudo-mucinous cyst. By some observers these appearances are regarded as areas of a colloidal degeneration within these tumours; but it is probable that they are composed of true thyroid tissue, because the presence of iodine can be demonstrated in the colloid material. Their origin is obscure. It has been suggested that in some instances they occur as metastases from the thyroid gland, for they have been found associated with goitre; but in most cases they must be regarded as embryomata, for other tissues, such as bone, cartilage, or nerve cells, are also present by no means infrequently.

Chorion-Epithelioma. — It is now recognized that chorion-epithelioma may occur in the ovary as a primary growth, and quite apart from any similar growths in the uterus or in the tubes. Two distinct types may be described.

In the first the ovary is the site of an embryoma, composed of the usual heterogeneous conglomeration of cells, among which the chorion-epitheliomatous cells are a prominent feature.

In the second the growth is a pure chorion-epithelioma. The malignant tissue is made up of clear cells resembling those of Langhans' layer, and of masses of undifferentiated protoplasm containing nuclei (syncytium).

It is by no means certain how these new formations arise. It may be that they represent an embryoma in which the cells of only one type persist, the others having been suppressed; or they may be the result of an ovarian gestation in which the growth springs from the coverings of the chorionic villi. Other views are that the chorion-epitheliomatous structures are due to a modification of the cells of certain ovarian carcinomata, particularly those which contain areas of degeneration and hæmorrhage, or that the tumours may

arise from portions of deported chorionic villi which been deposited within the ovary at a previous date.

Malignant Papilloma.

See Surface Papillomata, p. 418.

Malignant Tumours of Corpus Luteum.

Lutein Tissue.—In a few instances a malignant tumour has been demonstrated within the ovary, composed of cells resembling those of the corpus luteum. Such tumours are exceedingly rare; they have occurred usually between the ages of thirty and fifty, and do not appear to arise in connection with pregnancy. They may be unilateral or bilateral, solid or cystic; most are pedunculated, and a few have been lobulated; they seldom exceed the size of a man's head. Ascites is a common accompaniment.

On microscopic section they are seen to be composed of cells resembling those of the corpus luteum and of the cortical zone of the suprarenal gland. It is supposed that these tumours may originate from corpora lutea or from aberrant suprarenal tissue.

Sarcomatous Tissue has been seen occasionally within the wall of certain ovarian cysts. Thus, it has been demonstrated in the wall of a pseudo-mucinous or a papillomatous cyst, and occasionally in a cystic teratoma.

CHAPTER LIII

TUMOURS OF THE OVARY—*Continued*

ORIGIN OF OVARIAN TUMOURS.

Distension Cyst of the Graafian Follicle (Hydrops Folliculi.)—It is believed that these cysts arise from the distension of Graafian follicles which has not followed the ordinary course and ruptured. Such failure to rupture may be brought about by an increase in the thickness of the covering of the ovary, due possibly to inflammatory conditions, as they are so frequently found as part of a salpingo-oöphoritis.

If this view as to their origin is the true one, they are not, strictly speaking, growths of new formation, but are produced by the distension of a pre-existing cavity. In support of this view, it is urged that it is possible to trace all gradations from the normal follicle to the hydrops follicularis, and that ova have been demonstrated within the smaller cysts of this nature.

Corpus Luteum Cysts.—These are regarded as due to the distension of the altered follicle when it has become modified to form the corpus luteum.

It is supposed that the fluid contents are derived partly from the transudation of plasma from the surrounding vessels, and partly from the lutein cells themselves. If the fluid within the smaller cysts is examined, it is found to contain blood-corpuscles, fibrin, and lutein cells in a condition of fatty degeneration, and it is believed that hæmorrhage takes place into their cavity, and is followed by an overgrowth of the lutein cells.

Whence do these lutein cells arise? The answer to this is still disputed. Some hold that they are derived from the cells of the membrana granulosa, while others believe that they arise from the cells of the theca interna. The former view accords to them an epithelial, the latter a connective-tissue origin. Recent investigation supports this view, for it has been shown that lutein cells can be stained by Sudan 3, which will stain cells of the theca interna, but not those of the membrana granulosa.

Tumours of the Adenomatous Group (Pseudo-Mucinous Cyst Adenoma; Papillomatous Tumours).—The question of the origin of this group of tumours has been much discussed, and it is even yet unsettled. It may be assumed that adenomata arise from epithelial cells, for they are composed of cells of this type. In the normal ovary, epithelial structures occur as

1. The membrana granulosa of the Graafian follicle.
2. Wolffian remains.
3. Surface epithelium.

Each of these has been regarded as the source of these growths.

1. *Origin from the Graafian Follicle.*—This view has been widely held until recent years. It is based upon the fact that within adenomatous tumours certain structures have been demonstrated which closely resemble the Graafian follicle in appearance and shape, and which appear to be the starting-point of epithelial proliferation, both into the surrounding stroma and into the follicle cavity (adenoma of the Graafian follicle).

If these structures, so closely resembling follicles, can be proved definitely to be follicles, then the view of the follicular origin of the adenomata may be considered as established. But are these structures really follicles?

This is doubtful, for certain objections must be considered. It is known that ovules and primordial follicles are formed only during embryonic life, and it appears to be established that after this time their reproduction does not take place. Is it then possible to suppose that in a pathological condition new ovules are formed, or that they arise from the proliferation and division of pre-existing ovules? For this would be contrary to the normal in the ovary.

Further, the Graafian follicle is produced from the epithelium of a Pflüger's tubule, and in its formation certain characteristic changes occur, which do not take place in the production of these follicle-like bodies.

2. *Origin from Wolffian Remains.*—Within the hilum of the ovary it is possible sometimes to detect, on microscopic section, the presence of tubules. These represent Wolffian remains. It is claimed by some observers that a connection exists between them and the vertical tubules of the parovarium.

It is believed that certain of the adenomatous cysts (papillomata) arise from these structures. This view gains support from the following facts:

(*a*) The transition of a Wolffian tubule into a cyst cavity, in which papillomata appeared later, has been observed.

(*b*) Papillomatous cysts tend to burrow between the layers of the broad ligament, and may involve the hilum of the ovary alone. While this explanation is adequate in many cases, it has, however, been clearly demonstrated that they can arise independently of Wolffian structures, and Wolffian tubules have been found in the hilum without continuity with the papillomatous cyst.

3. *Origin from the Surface Epithelium.*—The ovary is not completely invested by peritoneum, but is covered by a layer of cubical epithelium. In some instances the epithelium from the Fallopian tube has been found to extend on to the ovary. Downgrowths from the surface layer into the ovarian stroma have been observed. These consist of cells arranged in the form of tubules resembling Pflüger's tubules. It is believed that the cells of the stroma invade the tubules, and so cut off small islands of cells from their deepest parts. Connection between these epithelial islands and the surface epithelium has been demonstrated, and, further, these cells have been observed to undergo proliferation and to form small cystic spaces lined by epithelium.

The trend of modern investigations is in support of the view that the adenomatous group of ovarian tumours have their origin in these small masses of epithelial cells derived from the surface epithelium, and it is probable that the carcinomata also arise from their proliferation.

Cystic Embryoma.—The study of the origin of these tumours is a fascinating one, and has led to a considerable amount of speculation. No definite decision has as yet been made as to their origin, and it is possible here to indicate only briefly some of the views that have been brought forward.

(*a*) It was for a long time supposed that tumours of this nature were dermoids, and comparable with dermoids situated in other parts of the body; but dermoids arise from the sequestration of infoldings of the epiblast, while the ovarian embryomata contain mesoblastic and hypoblastic structures as well as those derived from epiblast.

(*b*) An attempt has been made to explain their composition by supposing that they represent the impregnation of an ovum within the Graafian follicle. This is possible, but when it takes place an ovarian pregnancy results. Furthermore, it will be remembered that embryomata have been observed in virgins and in young children, and, what is of still greater significance, they have been found in the fœtus and in men.

(*c*) It is possible that one fertilized ovum as it develops within the uterus may include within itself a second fertilized ovum which

is near the developing mass. The tumour thus represents the included twin of the fully formed individual. If this is so, it is strange that embryomata occur far oftener in the ovary than they do elsewhere in the body. It has been observed, also, that the hair present in these tumours may differ in colour from that of the host, which is unlike what occurs in homologous twins.

(*d*) Another view is that the growths arise from the dislocation of a "totipotent" cell from the growing ovum (*i.e.*, a segmental cell which has not yet been differentiated). That this is possible has been demonstrated experimentally, for by shaking a blastomere can be detached from an ovum which may continue to develop separately.

(*e*) In certain insects the phenomena of parthenogenesis and sporogeny have been demonstrated. Do they also occur in the human being? This is very doubtful. In parthenogenesis the ovum matures and the stimulus is initiated by the fusion of the germinal vesicle with the second polar body, while in sporogeny the embryo develops in the absence of maturation or of fertilization.

(*f*) More recently the interesting view has been brought forward that embryomata arise from the fertilization at a later date of primordial ova within the ovary of the developing embryo (epi-embryogenesis). Primordial ova are found, it is true, very early in the embryo, and it is known that when an ovum is impregnated it may be penetrated by more than one spermatozoon; so that although it cannot be proved, it is conceivable that surplus spermatozoa may become engaged between the component cells of the growing mass, and in this way be ready to fertilize the primordial ova when they are formed.

CHAPTER LIV

TUMOURS OF THE OVARY—*Continued*

SYMPTOMS, SIGNS AND COMPLICATIONS OF OVARIAN TUMOURS.

Symptoms.

In the early stages the symptoms of ovarian tumours are usually so slight that they may not be noticed, and the patient may come to a doctor on account of painless enlargement of the abdomen only, or on the suspicion of pregnancy. In many cases, moreover, the presence of the tumour has been accidentally discovered in the course of a routine medical examination. When symptoms exist, they are usually due to pressure within either the pelvis or abdomen. Ovarian cysts may, however, be the cause of very grave and serious symptoms from torsion of the pedicle, inflammation, or rupture.

Menstruation as a rule is not affected, but there may be menorrhagia or metrorrhagia.. The latter is not uncommon in malignant ovarian disease. Amenorrhœa is very rare. Dysmenorrhœa is an uncommon symptom.

Sterility may occur, although ovarian tumours do not as a rule prevent pregnancy. The growth must be bilateral and both ovaries totally destroyed.

Breasts.—It is interesting to note that occasionally ovarian tumours may be accompanied by some signs of activity in the breasts. A knowledge of this is of importance to prevent a mistake in diagnosis between a cyst and pregnancy.

The symptoms may be considered according as—

1. The tumour occupies the pelvis.
2. The tumour occupies the abdomen.

1. **Pelvic Tumour.**—It is comparatively rare for an ovarian tumour to produce pelvic pressure symptoms, and it will not do so unless some unusual condition prevents the tumour from rising into the abdominal cavity, or the mass is so great that it is partly abdominal and partly pelvic. The conditions which may fix an ovarian tumour in the pelvis are (*a*) adhesions between the tumour

and the neighbouring structures; (*b*) an overhanging promontory of the sacrum; (*c*) growth of the mass between the layers of the broad ligament; (*d*) large size of the mass; (*e*) malignant infiltration.

If symptoms occur, they are those of pressure; there may be difficulty or frequency of micturition; rarely there may be retention of urine. Hæmorrhoids may be present, or prolapse of the rectal

FIG. 176.—LARGE OVARIAN CYST.

mucous membrane, and the patient may complain of difficult or painful defæcation. Pain may be felt in the sacral region and down the legs from pressure on the sacral plexus; but this is rare unless the growth is malignant. Œdema of the legs may be present; unilateral œdema is suggestive of malignant disease.

2. **Abdominal Tumour.**—When the tumour occupies the abdomen the patient may complain of shortness of breath or attacks of pal-

pitation on exertion, and if it is very large, orthopnœa. Vomiting and flatulence may occur. Pain may be caused not only by pressure, but from torsion, inflammation, or rupture of the cyst. It may be also the result of any sudden increase in size of the tumour. Frequently there is pain a few days before the period, possibly associated with the process of ovulation or the increased blood supply (Fig. 176).

Ascites may occur even in the case of innocent tumours, but it is more common in the case of papillomatous or malignant growths

Fig. 177.—Acute Torsion of the Pedicle of a Solid Ovarian Tumour, showing Hæmorrhage into the Tumour.

or benign solid growths. Frequency of micturition may be present. If the ureters are compressed, hydronephrosis, and even uræmia, may develop.

In the case of large ovarian tumours, quite apart from their being malignant, the patient may lose flesh and become sleepless and exhausted, presenting the "facies ovarica" (Fig. 176).

Complications.

Although symptoms as a rule are conspicuous by their absence, yet the patient is liable at any time to complications, some of which are of the most serious clinical importance—*i.e.*, torsion of the pedicle, hæmorrhage, infection, rupture, incarceration, and malignancy.

Torsion of the Pedicle.—The pedicle may undergo two varieties of torsion. By torsion is meant a rotation of the tumour in a horizontal axis so that the pedicle becomes twisted.

(*a*) The torsion may be of slow onset; if long and thin, the

pedicle will twist more readily and tightly. In this form the symptoms are not acute, but inflammation and adhesions to neighbouring structures usually follow. In some cases the torsion is only partial.

(*b*) The torsion may be acute. This is the more serious variety. As a result of the twist the structures within the pedicle become compressed, and the veins, being thinner-walled than the arteries supplying the tumour, are more compressed than the arteries. Thus the tumour becomes engorged with blood, and if the twist is not relieved strangulation results. Extravasations of blood may be found within the cyst, and hæmatomata within the cyst wall, which cause the cyst to become enlarged and tender. Strangulation is rarely followed by sepsis, the infection probably coming from the bowel, and adhesions form, which at first can be separated by the fingers but later require division. The cyst may be covered by layers of lymph (Fig. 177).

The torsion may be less than a complete circle, or there may be several twists. There is no fixed rule as to the direction of this twist; it is commonly from within outwards in either ovary.

Cause.—The cause of torsion is not known with certainty. The following views have been brought forward:

(*a*) It may be due to sudden muscular exertion on the part of the patient. This may explain some cases, but not all, for the twist may occur when the patient is asleep in bed.

(*b*) It may be due to the unequal growth of the tumour itself.

(*c*) It may be due to the peristaltic action of the intestines.

(*d*) It may be due to enforced change of position of the tumour, caused by enlargement of the uterus during pregnancy or its rapid diminution in size during labour and the puerperium.

Whatever be the cause, the most common type of tumour to rotate is the small or medium-sized cyst about the size of the fœtal head, particularly if it has a long mobile pedicle.

Results.—The results of torsion in the partial or slow variety are inflammation of the tumour with the formation of adhesions. The symptoms vary greatly in different cases, so that one patient may complain of little, whereas in another patient the symptoms are severe and resemble those of an acute peritonitis. The symptoms depend upon the degree and tightness of the twist. In the acute variety the mass becomes strangulated, and may eventually suppurate; very rarely a generalized peritonitis follows.

Another and much rarer result of torsion, except in the case of dermoids, is that the pedicle may slowly atrophy, with the result that the tumour becomes separated in the abdomen. Later it finds

a new attachment by adhesions to any neighbouring structure, most commonly omentum. These are called "parasitic cysts."

Symptoms.—In the slow forms the patient has an attack of abdominal pain, which is often repeated. The temperature and pulse-rate are raised. The tumour becomes firmer and tender, and its mobility is restricted. There may be accompanying constipation or diarrhœa.

In the acute form the patient is suddenly seized with a severe abdominal pain due to tension and peritoneal irritation. The temperature may be subnormal, the pulse feeble in volume, and there is frequently vomiting and occasionally fainting.

The symptoms are very severe, and may simulate appendicular colic, biliary colic, renal colic, perforation of a gastric ulcer, the rupture of an ectopic gestation sac, or intestinal obstruction. Later the temperature and pulse-rate gradually rise, and signs of peritonitis develop; the abdomen may become markedly distended, so that the outline of the cyst is obscured on palpation and the diagnosis is made difficult.

Infection.—Infection of an ovarian cyst may follow torsion of the pedicle. It is stated to be more common in cystic teratomata than in the other forms of ovarian tumours. The known infective organisms are the coliform bacillus, tubercle bacillus, typhoid bacillus, the streptococcus pyogenes, and the pneumococcus. Infection is specially liable to occur after labour or abortion.

Cause.—The modes of infection are—

(*a*) From the intestinal tract, as the result of adhesions between the tumour and the gut; organisms may pass from the intestine along these adhesions. The presence of coliform bacilli is common in suppurating ovarian cysts. It must also be borne in mind that the appendix, which is near the ovary on the right side, may be the infecting agent.

(*b*) It may be infected from inflammation of the Fallopian tube.

(*c*) It may be infected by the blood-stream, especially in connection with parturition and typhoid fever. Small cysts situated in the pelvis which have been injured during labour are especially liable to infection.

Infection used to occur when tapping was the usual method of treatment of an ovarian cyst.

Result.—As a result of infection adhesions are produced, and, rarely, the cyst may suppurate. It may then evacuate itself into the intestine, or into the bladder. Many chronic abscesses of the ovary, however, on culture prove to be sterile.

Symptoms.—Infection may be suspected when there are pain, irregular fever and other signs of toxic absorption, and the tumour is found to be fixed and tender.

Rupture.—Rupture of an ovarian cyst is by no means so rare as some textbooks would lead one to suppose.

Cause.—Rupture may be caused by injury; by too forcible examination under anæsthesia; by sudden increase in size of the tumour; from extravasation of blood due to acute torison; by thinness of the wall, especially if it is degenerated or necrotic; and by malignant papillomatous disease. It may occur during pregnancy.

The following forms of ovarian growths are liable to rupture:

1. Thin-walled ovarian cyst. In this case rupture is often the result of injury. The patient may develop sudden ascites.

2. Pseudo-mucinous cyst, especially if degenerate or necrotic.

3. Papillomatous cysts, by the burrowing action of the contained papillomatous masses.

4. Rupture of an infected "dermoid cyst," with the escape of dermoid contents into the abdominal cavity.

5. Rupture of a suppurating cyst. The pus escapes, and may result in a generalized peritonitis. This occurs very rarely; usually there are so many adhesions around that leakage is prevented.

Results.—The result will not be serious if the fluid is of a simple character, when the extravasated fluid may be quickly absorbed. This is usually accompanied by an increased output of urine. Sometimes a sudden ascites may result; at others the leak may be very gradual, and only discovered during operation. In many cases a pseudo-myxomatous condition of the general peritoneum may result from the rupture of this form of cyst, especially if the contents are gelatinous—"the jelly tumour." The gelatinous masses become attached to the peritoneum and are able to continue to grow, and may assume an enormous size. According to one author, these masses are metastatic implantations and not malignant in nature. Clinically they are malignant, but histologically innocent. After the removal of the parent tumour these masses may disappear (see p. 411); often they go on growing. If papillomatous masses escape they may become implanted upon the peritoneum, and there continue to grow and produce ascites. These metastases, again, are not necessarily malignant, for if the main tumour be removed they may disappear (see p. 414). If a vessel is torn in the cyst wall, there may be fatal internal hæmorrhage.

Incarceration.—Typically an ovarian cyst is mobile. But it may become fixed by any of the following conditions:

1. By adhesions owing to previous inflammation or torsion.

2. By burrowing between the layers of, or under, the broad ligament and so becoming extraperitoneal.

3. By impaction within the true pelvis, especially in cases of contracted pelvis, in which the promontory of the sacrum is displaced forwards.

4. By infiltration of malignant new growth.

5. By the presence of the pregnant uterus, or in combination with a uterus containing fibroids.

Malignant Changes.—Malignant changes may occur in many types of ovarian cyst. Often this change is not at first noticeable clinically, and is only discovered on microscopic examination. More systematic histological examination has proved this change to be not so rare as was formerly supposed.

Malignant change may occur in a "dermoid cyst," in a papillomatous cyst, and even in one or more loculi of an ordinary pseudomucinous cyst. These remarks may suffice here, as this subject is more fully considered in the section devoted to malignant ovarian disease.

For ovarian cysts complicating pregnancy and parturition, see "Midwifery," by Ten Teachers, pp. 220, 499, 651.

Signs.

Ovarian Tumours.—Ovarian tumours vary much in size and position. It will be convenient for purposes of description to describe the physical signs and diagnosis of these tumours according as they are small tumours and situated in the pelvis or larger ones in the abdomen.

Small Tumours in the Pelvis.—On examination the tumour is globular or oval in shape, and varies in size from that of a tangerine orange to that of a fœtal head. It is usually behind the uterus in Douglas's pouch, in which case the cervix and the body of the uterus are displaced forwards, if the tumour is large enough. When the tumour is small, it will frequently be found behind one or other broad ligament, displacing the cervix and uterine body to the opposite side. In rare instances, when provided with a long pedicle, it may be in front of the uterus, especially if a dermoid. In consistence the mass is elastic, fluctuation is seldom obtainable, partly because the cyst walls may be tense, and partly because the cyst may contain many loculi. The outline is usually smooth, even in the case of multilocular cysts, but it may be lobulated.

The uterus can as a rule be moved apart from the tumour, owing

to the presence of the pedicle, and this is a characteristic feature. Exceptions to this statement are: (*a*) When the tumour is adherent to the uterus; (*b*) when it lies between the layers of the broad ligament.

The tumour is not usually tender.

Large Cystic Tumours in the Abdominal Cavity.—The physical characters of the tumour will depend upon the size and variety of the cyst. Medium-sized cysts usually form rounded tumours, situated mainly in the middle line of the lower abdomen. The surface of the tumour is smooth, when the cyst is unilocular or is composed of loculi which do not project above the general level of the cyst wall. If, however, some loculi project, or if the cyst contains masses of solid growth, the surface may feel irregular or bossed. The consistence varies: unilocular cysts or cysts containing few loculi or little solid material, with contents of low specific gravity, are elastic: they fluctuate, and a fluid thrill can be obtained over them. The tumours are usually mobile; the mobility is more marked in a lateral than in a vertical direction. The percussion note over them is dull, resonant elsewhere over the abdomen, including the flanks; on auscultation the tumour is dumb and the uterine souffle cannot be heard. On vaginal examination the cervix is usually low down, freely movable, and is not enlarged; the body of the uterus may be difficult to palpate owing to the abdominal swelling, but when it can be felt it is found to be separate from the tumour.

Symptoms and Signs of Malignant Ovarian Disease.

The symptoms usually begin with pain, which may be sudden and acute or gradual in onset, and is referred either to the abdomen or pelvis.

Enlargement of the abdomen may first attract attention. This may be slow, but is subject to sudden increase, due partly to growth and partly to ascites.

Hæmorrhage from the uterus may be the first symptom, and some irregularity of menstruation is commonly present.

As the disease advances the patient complains of loss of weight, vomiting, and gastro-intestinal disturbances. On examination the patient presents the signs of loss of flesh, the skin is wrinkled, and she may look cachectic. The abdomen in the case of large tumours is distended by irregular firm lobulated masses which have a limited mobility or may be fixed. Ascites is a usual accompaniment, and secondary masses may be detected in the situation of the omentum or the liver.

On vaginal examination it is usual to find the cervix fixed, and the vaginal vault occupied by hard knobby masses which may be completely fixed. Œdema confined to one leg or to one side of the vulva is suggestive of malignant infiltration of the corresponding side of the pelvis, while œdema of both legs or the whole vulva is commonly seen with any large abdominal tumours. Unfortunately, the symptoms enumerated above are but slight in the early stage of malignant disease, and it is not until the condition is advanced that the symptoms become marked.

A mistake frequently made is to diagnose a malignant ovarian tumour in a woman who has passed the climacteric as a uterine fibroid.

CHAPTER LV

TUMOURS OF THE OVARY—*Continued*

DIFFERENTIAL DIAGNOSIS AND TREATMENT OF OVARIAN TUMOURS

PELVIC TUMOURS.

A small ovarian tumour has to be differentiated from—

1. Salpingo-oöphoritis.
2. Hydrosalpinx.
3. Tubal gestation.
4. Uterine fibroid.
5. Early pregnancy.
6. Fæces.
7. Malignant disease of bowel—*i.e.*, cæcum or sigmoid.

Salpingo-oöphoritis.—In this case there is often a suggestive history, abdominal pain, and raised temperature and pulse-rate. The mass is seldom large, may be bilateral, is painful to touch, and variations in its size may occur. If the case is chronic, adhesions are present and the mass is fixed. These points will serve to diagnose it from an ovarian tumour, which is not tender, and is freely mobile. But it must be remembered that a small inflamed ovarian tumour may give similar physical signs and symptoms.

Hydrosalpinx.—If a hydrosalpinx is present, there is frequently a clinical history of pelvic inflammation, and the mass, as a rule, is tender. It may be bilateral. The walls are very thin to the touch, and the convoluted uterine end may be felt passing towards the fundus uteri. A hydrosalpinx cannot be so clearly separated from the uterus as an ovarian tumour, and may be fixed.

Tubal Gestation.—Here there may be a past history of pelvic inflammation followed by a period of sterility. The patient may suspect she is pregnant; she may have missed a menstrual period and have morning sickness. The uterus is somewhat bulky, and

the tumour lies to one side, not usually behind it, unless there is a hæmatocele. The mass is often oval in shape, the size of a hen's egg. It cannot be so clearly felt apart from the uterus as can an ovarian tumour. If the ovum has died, the patient will give a history of attacks of abdominal pain accompanied by vaginal hæmorrhage, and sometimes the passage of a decidual cast.

Uterine Fibroid.—If the fibroid is attached to the uterus by a long pedicle, its diagnosis from an ovarian tumour is difficult. But frequently there are interstitial or submucous fibroids present in addition, in which case there will be a history of menorrhagia, and the uterus will feel enlarged.

The history of an increase in size will help, for an ovarian tumour grows more rapidly than a fibroid. The mass is more attached to the uterus, which, if other fibroids are present, will be elongated, in which case the uterine sound will be found to pass a greater distance than usual. But a broad ligament cyst may also cause elongation of the uterine cavity. A subperitoneal fibroid is rarely soft, and so can be differentiated from a cyst unless the cyst walls are tense.

Early Pregnancy.—This may present difficulty in diagnosis from an ovarian tumour under two conditions:

(*a*) If the pregnant uterus is retroflexed.
(*b*) When Hegar's sign is present.

Retroflexed Gravid Uterus.—This must be suspected if there are symptoms and signs of early pregnancy; if the mass lies in Douglas's pouch, and the cervix is pushed not only forwards but upwards, and is consequently very difficult to feel. Frequency of micturition or retention of urine are very significant of this complication. Further, the body of the uterus cannot be felt in its usual position; manipulations of the mass may cause it to vary in consistence when the uterine muscle contracts and relaxes; and, finally, the mass may be raised out of the pelvis, and will then be identified as the body of the uterus.

The serum diagnosis for pregnancy has been considered as an aid in the diagnosis.

Hegar's Sign.—The ovum in the first ten weeks of pregnancy usually occupies the upper part of the uterus. The lower portion of the uterus is therefore empty, and as its tissues here are softened on a bimanual examination, the fingers appear to meet when the lower portion of the body of the uterus is compressed. The cervix, however, is not so much softened at this stage, on account of the

larger amount of fibrous tissue which it contains, so that the connection between cervix and body may not be made out. A mistake in diagnosis may occur in this way: the cervix is felt as a firm mass and mistaken for the uterus, and the upper part of the uterus feels elastic and appears to be quite separate from the cervix, and is regarded as a pelvic tumour.

This mistake should not occur if the possibility of this error is borne in mind, and if there are present in addition early symptoms and signs of pregnancy. In a doubtful case an examination should be made at a later date.

Fæces.—Mention may be made of the importance of having the rectum completely evacuated. Mistakes have occurred, and fæcal masses, especially when indurated and lobulated, have been regarded as solid ovarian tumours. These masses can, however, often be indented on vaginal examination; but it is wise never to form a positive opinion unless the lower bowel has been emptied by enemata.

Malignant disease of the bowel, especially of the cæcum or the sigmoid, has been mistaken for an ovarian tumour. The patient will usually give a history of having passed blood and mucus from the bowel, and of constipation alternating with diarrhœa. A careful pelvic examination may show that the ovaries are palpable apart from the mass, and do not feel abnormal. It is possible for malignant disease of the bowel to involve the ovary and *vice versâ*.

LARGE TUMOURS SITUATED IN THE ABDOMINAL CAVITY.

It is necessary as a first step in the diagnosis to recognize the presence of a definite tumour. The following conditions may simulate an ovarian tumour in the abdomen:

1. Obesity.
2. Ascites.
3. Flatulent bowel.
4. Fæcal accumulations.
5. Distended bladder.
6. Encysted collections of fluid.
7. Phantom tumours.

Obesity.—It is by no means always easy to differentiate between obesity and an ovarian tumour. It must further be borne in mind that this difficulty may be increased by the two conditions co-existing in the same patient.

The swelling in the case of an ovarian tumour is limited to the abdomen, whereas in an obese person the fat is a marked feature in other portions of the body. Further, an important point to notice is the condition of the abdominal walls. In the case of obesity they are thick, and a fatty layer can be grasped superficial to the abdominal muscles when these are made to contract, while the umbilicus is depressed; in the case of an ovarian tumour the abdominal walls may be tense, and are often thinned, while the umbilicus is at the level of the surface, or even pushed above it as a result of an increase in the intra-abdominal pressure from the presence within it of the growth. With an ovarian cyst a definite tumour can be outlined; with obesity no definite outline can be determined. It must be remembered that occasionally, with a large thin-walled, multilocular ovarian cyst, this feeling of an outline may be difficult to obtain. The percussion-note is of assistance also; for with an ovarian tumour the note is dull over the mass, whereas with obesity the note is resonant over the whole abdomen. It is often necessary to use deep percussion in eliciting this; as, owing to the abnormal thickness of the abdominal walls, a dull note will be obtained by light percussion.

In some instances no decision may be possible without an examination under anæsthesia. A useful aid in palpation is to place the hands one on each side of the abdomen, and to try to get them to meet. If a tumour is present they will not do so.

Ascites.—Ascites may simulate an ovarian cyst which entirely fills the abdomen and has indistinct outlines. A differential diagnosis must now be made by inspection, palpation, percussion, and mensuration.

On Inspection.—For this the patient must lie upon her back. With an ovarian cyst the abdomen is prominent, especially in the middle line, while the flanks are only slightly expanded by the displaced intestines. With ascites the abdomen is flattened in the centre, but the flanks bulge markedly owing to the gravitation of the free fluid into them. The appearance of the umbilicus is of no value, for it may project in both cases.

On Palpation.—An ovarian tumour can be definitely outlined; with ascites no definite mass can be palpated. If the ovarian tumour is cystic and has large loculi, a fluid thrill can be obtained, limited to the area of the tumour; with ascites a thrill can be obtained, however, all over the abdomen, provided there is enough fluid, and its presence is not limited to a particular region.

On bimanual examination, the uterus is more freely movable in the case of ascites than with a large ovarian cyst.

On Percussion.—With an ovarian cyst the note is dull over the tumour, which usually occupies the central region of the abdomen, while the note over the displaced intestines situated in the flanks is resonant; with ascites the converse is found—the central region of the abdomen is resonant, for the intestines tend to float up against the anterior abdominal wall, while the note over the free fluid in the flanks is dull. Further, if the patient is turned upon her side, the upper flank will now give a resonant note on percussion,

Fig. 178.—Area of Dulness (shown by Shaded Lines), in a Case of Ovarian Cyst.

because the intestines will float against this region, while the free fluid will gravitate to the flank in apposition with the bed. This phenomenon is characteristic of the presence of free fluid, and is known as "shifting dullness." If, however, there is an ovarian cyst which, contrary to the general rule, has grown towards one side, or has become fixed in this situation by adhesions, this sign will not be obtainable, and the flank will remain dull on percussion. Sometimes, if the mesentery is abnormally short, the note will be dull in front even if ascites is present (Figs. 178, 179).

On Mensuration.—With an ovarian cyst the greatest girth is below the level of the umbilicus; with ascites it is at the umbilicus.

The differences already stated serve generally to distinguish between the two conditions; there are, however, more difficult cases, as, for example, in patients in whom the ascites has developed rapidly, in whom the abdomen is everywhere prominent, and in whom the ascitic fluid is not easily displaceable. In these patients, in order to differentiate between the presence of free fluid or an ovarian tumour, it is necessary to note the extreme rapidity of the

Fig. 179.—Area of Dullness (shown by Shaded Lines), in Ascites.

accumulation of the fluid, the general health, and the presence of œdema; also to examine the condition of the heart, lungs, and kidneys.

Flatulent Bowel.—Here the abdomen may be prominent and the umbilicus may not be depressed. But no definite tumour can be palpated, and the percussion note is everywhere resonant. Further, peristaltic movement may be observed. If any doubt exists, another examination should be made, under an anæsthetic if necessary, after the patient has had the bowels thoroughly cleared.

Fæcal Accumulations.—Fæcal masses may cause an error in diagnosis, not only because a thorough examination is difficult if the intestine is loaded, but also because the masses may collect at either side of the abdomen in the region of the cæcum and of the pelvic colon, and by their large size and firm consistence they may lead, and have led, to the mistaken diagnosis of solid ovarian tumours. It is necessary, therefore, to be certain that the bowel is properly cleared, in order to avoid this mistake.

Distended Bladder.—Without due care the distended bladder may be easily mistaken for an ovarian cyst. The error is made partly because it forms an elastic mass at the brim of the pelvis, and partly because a false incontinence of urine may result from an overdistended bladder. Therefore it is a safe rule always to pass a catheter in all cases of abdominal tumour of cystic nature, especially if complicated by urinary symptoms, whether there be incontinence, retention, frequency, or difficulty in micturition. When passing the catheter, care should be taken to pass it well in, or else urine may not be withdrawn, and the bladder be thought empty; this is due to obstruction at the brim of the pelvis or displacement of the urethra. The distended bladder narrows at its apex; it is not freely movable, for it is under the peritoneum, it does not possess any pedicle, and it lies anteriorly to the uterine body. Cases have been described in which the distended bladder reached up to the epigastrium, and one in which the whole catheter was passed up the urethra and then lost within the bladder. A bladder may be so full as to extend to 2 or 3 inches above the umbilicus without causing symptoms.

Encysted Collections of Fluid.—In these cases the difficulties in diagnosis may be extreme, for the fluid may be shut off by intestinal adhesions and give the appearance of a tumour.

Such collections occur in cases of tuberculous and other forms of chronic peritonitis, in malignant disease and as a result of pelvic inflammation, and in pelvic peritonitis with effusion. But they differ from an ovarian cyst in the following points: They do not cause so marked a prominence of the abdominal wall; although they feel like a tumour, yet the outline is not definite, and is not regular or rounded; no pedicle can be felt attaching the mass to the uterus; the mass is not so freely mobile, since it is surrounded by adherent bowel, and for the same reason, on percussion, the note may be resonant or not markedly impaired. Further, the general condition of the patient as to the temperature, tenderness of the mass, signs of tuberculosis elsewhere, or evidence of malignant disease, must be taken into account.

Large Cystic Tumours of the Abdominal Cavity: Diagnosis from Other Tumours.

Tumours of the Uterus—Normal Pregnancy.—The commonest abdominal tumour in a woman is the pregnant uterus. A mistaken diagnosis is most likely to be made in unmarried women, unless a routine examination is made, including inspection of the breasts. When a reliable history can be obtained, it possesses a definite value. Pregnancy should be suspected if a woman in a child-bearing period of life, who has previously menstruated regularly, suddenly ceases to do so. It must be remembered, however, that a woman may conceive during a period of amenorrhœa due to lactation, also that a pregnancy may be complicated by hæmorrhages which the patient thinks are menstrual periods. If the woman is pregnant, examination of the breasts will generally reveal signs of activity. The abdominal swelling can be made to harden on palpation. The fœtus may be palpated, fœtal movements felt, a uterine souffle and the fœtal heart heard.

Abnormal Pregnancy.—When pregnancy is complicated by hydramnios, a differential diagnosis is more difficult; for in this condition the uterus feels like a cyst, a marked fluid thrill can be obtained, and the presence of a fœtus may be obscured. But in hydramnios, in addition to evidence of pregnancy, the tumour can be made to contract, a uterine souffle will be heard, and on bimanual examination the cervix is felt to be continuous with the abdominal mass, and no body like the uterus can be felt separate from it.

Hydatidiform mole may be excluded in the same manner, and though the patient rarely gives a history of having passed vesicles, she has usually suffered from uterine hæmorrhage.

Hæmatometra.—It is possible that a uterus distended with blood might be taken for an ovarian cyst. But the condition is a rare one, and the patient states that, although she has each month the other changes characteristic of a period, she passes no blood; also that the swelling at these times becomes more painful. The tumour again can be made to contract, a uterine souffle may be heard, and a bimanual examination reveals its connection with the cervix, and that the body of the uterus cannot be felt apart from it. The cervix is not patent, and presents evidence of some abnormality which caused the obstruction to the outflow of menstrual blood.

Uterine Fibroids.—Usually fibroids are solid tumours which grow slowly and often cause menorrhagia; they are attached to the uterus, and the uterine cavity may be elongated. On the other hand,

ovarian tumours are usually cystic, they grow rapidly, menstruation is unaffected, and they are separate from the uterus. A consideration of these facts usually serves to differentiate the two conditions, but when the fibroid has undergone softening or is cystic a differential diagnosis may be difficult. A consideration of the following further points will aid in a diagnosis:

1. The presence of a bruit over the tumour. A softened fibroid is often vascular, and a bruit may be heard over it; it is not heard over an ovarian cyst.

2. In fibroids the bladder is often enlarged and drawn up; with ovarian tumours it is not as a rule displaced.

Other Tumours, some of which are rare, should be considered, such as renal tumours, hydronephrosis, pancreatic cysts, mesenteric cysts, tumours of the spleen, and hydatid cysts.

Diagnosis of Malignant Ovarian Disease.

The diagnosis that a given ovarian tumour is malignant may be impossible in some cases on clinical evidence, or on naked-eye examination alone, and may be established only by microscopic examination. It has already been pointed out that innocent ovarian cysts assume malignant characters, and that the border-line between innocency and malignancy, especially in the cases of the papillomatous growths, is but ill-defined. The diagnosis that an abdominal tumour is ovarian has already been considered. That it is malignant rather than innocent should be suspected on clinical grounds if there is—

(*a*) Rapid loss of flesh in the case of a small ovarian tumour: for whereas an innocent cyst may be associated with cachexia, this is unlikely unless the mass is of enormous size.

(*b*) A large amount of ascitic fluid.

(*c*) Unilateral œdema of the vulva or legs.

(*d*) Evidence of malignant disease elsewhere in the body.

(*e*) The presence of irregular nodules on the surface of the growth, which may be adherent to the wall of the vagina or the bowel.

(*f*) The fixity of the mass.

(*g*) A tumour on each side.

The Treatment of Ovarian Tumours.

An ovarian tumour, once it has been diagnosed, should be removed with as little delay as possible.

Not infrequently the patient will object to any operative pro-

cedure because she does not feel ill and has no abnormal symptoms. It is a striking clinical fact that ovarian tumours may be for a time unassociated with symptoms. Nevertheless removal of the tumour is to be insisted upon. It must be pointed out that it will continue to grow, and eventually, therefore, necessitate removal at a time when the operation may be more difficult on account of the size of the tumour, or from the presence of adhesions between it and the intestine. Further, the patient must be told of the great risks she runs owing to the complications that may ensue at any moment, such as torsion of the pedicle, inflammation or rupture of the cyst. Nor is it always possible to exclude malignancy without an operation, and even innocent tumours may assume malignant characters.

Ovarian tumours may be removed by the vaginal or the abdominal route. If the tumour is cystic, unilocular, small, and non-adherent, it may be removed through the posterior fornix after it has been incised and emptied. The abdominal operation, however, is to be preferred in all cases. The operator can see exactly what he is doing, adhesions can be more easily dealt with, and, provided a sufficiently large incision has been made, it is not necessary to tap the cyst before its removal. Thereby he obviates the risk of sepsis from an infected cyst and the scattering of malignant cells, especially in the case of papillomatous growths. It is for these reasons that the tapping of ovarian cysts has fallen into disuse. For tumours known to be malignant, if radical treatment is impossible, palliative measures may be adopted to relieve the pressure symptoms, such as withdrawal of the ascitic fluid, or removal of the main growth if this presents no difficulty, although secondary nodules are left.

Two exceptions to the rule that an ovarian tumour must be removed as soon as possible should be considered:

1. The tumour may be found in a woman who is in labour, when its presence may be neglected for the time being if it is above the brim.

2. Bilateral lutein cysts associated with hydatidiform mole.

For the treatment of ovarian tumours complicating pregnancy, parturition, and the puerperium, see pp. 222, 500, 560 of the companion volume on midwifery.

CHAPTER LVI

DISPLACEMENTS OF THE OVARY

Non-Descent.—Non-descent of the ovary is an extremely rare condition. A few cases, however, have been collected in which the ovary was found between the brim of the pelvis and the kidney, and in relation to the ureter.

The ovary may, however, be displaced as a result of inflammation. This is frequently seen in cases of inflammation of the Fallopian tubes and pelvic peritoneum, and on account of the contraction of the inflammatory exudate it often comes to lie behind and attached to the body of the uterus.

Prolapse.—This frequently occurs in association with uterine retrodisplacements and with uterine prolapse. If these conditions are the cause, both ovaries are usually displaced. Prolapse of the ovary may occur, however, independently of either of these conditions in patients whose ovarian ligaments are relaxed, probably from childbirth, or in whom the ovary is increased in size, and so is somewhat heavier than usual. In cases of this description only one ovary may be prolapsed.

As a result of the malposition the ovary frequently becomes tender to the touch, and may become adherent to neighbouring structures.

Symptoms.

Symptoms may be entirely absent, and the condition discovered only in the course of a routine examination. When symptoms are present, the patient will complain of a dull aching pain within the pelvis or over the sacrum, accentuated on defæcation. The prolapsed ovary is tender to the touch, and is a frequent cause of dyspareunia. Menstruation is usually unaffected, but it is sometimes excessive and painful.

Treatment.

All cases do not require treatment. When the condition is associated with pain, an attempt should first be made to ascertain the cause of this ovarian prolapse, and if it is due to displacement

of the uterus, this should be corrected, whereby the ovary will be drawn up.

When no accompanying displacement of the uterus exists, palliative measures should be tried, such as rest in bed, vaginal douches, careful regulation of the bowels, and by the insertion of a rubber vaginal pessary, the action of which is not to push up the uterus, but to lift up the tender ovary. Although these measures employed to relieve the ovarian congestion may considerably relieve the pain, they but rarely cure it. Should the pain be severe, it may be necessary, after hot vaginal douches and 5 per cent. ichthyol tampons have been tried without success, to stitch up the ovary either by shortening the ovarian ligament or by attaching the meso-salpinx to the peritoneum at the level of the pelvic brim.

Hernia. — Two varieties may be described—congenital and acquired.

Congenital Hernia.—The ovary is situated in the inguinal region, within the canal of Nuck. This abnormality is often associated with some congenital defect of the genital organs, and microscopic section has shown the supposed ovary to be a testicle in some cases.

Acquired Hernia.—This is much the commoner variety of the two. The ovary has been discovered in most forms of acquired hernia, usually in the inguinal variety. Within the hernial sac, in addition to the ovary, the Fallopian tube is usually seen; sometimes a piece of intestine or of the great omentum may be present. Such displaced ovaries are usually functional, and may become enlarged and tender during menstruation.

Treatment.

The hernia will require surgical interference, and during the course of the operation the ovary should be inspected, and, if healthy, returned into the abdomen.

Hæmatoma of the Ovary.—Bleeding may occur into the substance of the ovary in various conditions:

1. It is common to find, on opening an ovarian cyst, particularly a pseudo-mucinous cyst, that the fluid-content may present different degrees of pigmentation owing to the extravasation of blood into a loculus. The bleeding probably occurs from the breaking down of bloodvessels situated within the walls of the growth or within the septa between the loculi, and as the partitions between the different loculi break down these bloodvessels are torn across.

In some instances the cyst may be distended with blood, tender to the touch, and may even rupture.

2. Torsion of the pedicle of an ovarian cyst is, as a rule, accompanied by the extravasation of blood both into the cyst cavity and into its wall.

3. Hæmorrhages are a common feature in malignant disease of the ovary, especially sarcoma.

4. In the case of ovarian pregnancy, the ovary may contain a large area of hæmorrhage, and the gestation area may be distended with blood.

5. Hæmatoma of the ovary (apoplexy of the ovary). Although bleeding may occur into the ovary in association with any of the preceding conditions, they are not, strictly speaking, included under the term hæmatoma, which is limited to those cases in which the hæmorrhage takes place in connection with the ripened Graafian follicle or the corpus luteum.

The bleeding is said to be circumscribed when it is contained within the follicle or corpus luteum, and diffuse when it is not thus limited, but is extravasated into the ovarian stroma.

Pathology.

The ovary is enlarged, but usually does not exceed the size of a hen's egg. It is purple in colour and has a globular outline. Sometimes it is thickened and is unaltered in colour. The surface may be smooth, but nearly always it is roughened from the presence of adhesions; it may be lobulated, corresponding to loculi within.

On laying open the tumour, it may be found to contain one or more cystic cavities varying in size from a cherry to a golf-ball. The cysts contain altered blood, often tarry in colour and consistence, and resembling hæmatocolpos fluid.

As seen under the microscope the walls of these cysts are composed either of fibrous tissue or more often of lutein tissue in large amount. The remains of the stratum granulosum of the Graafian follicle can seldom be demonstrated.

Hæmatoma of the ovary is by no means an infrequent condition. It occurs usually within the child-bearing period of life, and may be associated with some diminution in fertility. It is often associated with uterine fibroids. The causation is not clear. It is believed to have some connection with the processes of ovulation and menstruation. If for some reason the ripened follicle fails to dehisce upon the surface of the ovary during the stage of premenstrual congestion, hæmorrhage, from rupture of vessels in the wall, may

occur into the cavity of the follicle or into the stroma of the ovary. Non-rupture of the follicle may depend upon either an unduly thickened tunica albuginea or insufficient tension. It is possible that so-called "intermenstrual pain" is the result of increased tension in a follicle the covering of which is thickened and hinders its rupture.

Symptoms and Signs.

If the condition is acute, the patient complains of a sudden attack of abdominal pain, which may be severe enough to simulate an attack of renal colic or of appendicitis.

In some instances bleeding may take place, not into the ovary, but into the abdominal cavity. Intraperitoneal bleeding of this nature may be sufficient to cause grave symptoms. When the hæmorrhage is less in amount, the blood may collect in the pelvis and form a pelvic hæmatocele. It is now recognized that not all cases of pelvic hæmatocele are the result of ectopic gestation.

In the chronic variety the patient complains of pelvic pain and menorrhagia, sometimes metrorrhagia, and the condition may be mistaken for salpingitis. The pain is increased at the time of the periods, but may be present independently. On examination, the ovary is enlarged and tender to the touch; usually one ovary, but sometimes both, are involved. The mobility of the swelling is, as a rule, limited on account of adhesions. The diagnosis has to be made from an ectopic gestation, and this may not be possible without opening the abdomen.

Treatment.

If the pain or hæmorrhage is severe, the abdomen must be opened and the ovary removed; but when both ovaries are involved, an attempt should be made to leave a piece of ovarian tissue.

CHAPTER LVII

TUMOURS OF THE FALLOPIAN TUBE

Although inflammatory lesions of the Fallopian tube are so common, solid new growths are rare.

Cysts of the Fallopian tube are frequently seen, but they are usually small, produce no symptoms, and are found during an operation for some other condition. These small cysts may be merely dilated lymphatics, or may develop from Müllerian or Wolffian remains and then are lined by cubical epithelium. The most constant situation for a small cyst of this kind is at the fimbriated extremity of the tube; here it is called a "hydatid of Morgagni." A hydrosalpinx may result from inflammation of an accessory Fallopian tube; when this occurs it appears as a thin-walled cyst lying adjacent to the main tube. True hydatid cysts caused by the echinococcus are extremely rare.

Solid tumours of the Fallopian tube may be simple or malignant. The simple growths that have been met with in the tube are dermoid, enchondroma, fibromyoma, and lipoma. They are all rare, and not of much clinical importance, as they give no physical signs by which they can be recognized before operation. The malignant tumours are carcinoma, chorion-epithelioma, papilloma, and sarcoma. They may be primary or secondary.

Primary papillomata of the Fallopian tube are very rare. They grow from the mucous membrane. Papillomata secondary to a papillomatous ovarian cyst, and involving the peritoneal surface of the tube by direct continuity, are often seen. The symptoms of primary papillomata are the same as those of carcinoma, but the papillomata are of low malignancy.

Carcinoma of the Fallopian Tube.—Carcinoma of the tube is not common. It is very frequently bilateral, and follows tubal inflammation in some cases.

Symptoms.

The disease is usually seen in elderly multiparæ, and the cardinal symptoms are constant pelvic pain and discharge. The latter is watery in character, profuse, and often sanious.

The growth soon blocks the exits of the tube, and so the latter becomes distended and forms a hydrosalpinx, or more frequently a pyosalpinx. In the early stages the growth is limited to the tube, but later it spreads to the surrounding peritoneum, and involves the uterus, ovaries, and bowel, and produces symptoms referable to those organs.

Tumours of the tube are not attended by any definite signs. In the early stage they form small masses palpable in the postero-lateral quarters of the pelvis, and accompanied by leucorrhœa; later on ascites may develop, and this and the extension of the growth to surrounding parts may form a mass which is palpable *per abdomen*. In order to diagnose these growths while they are still in an operable stage, attention must be paid to a watery discharge occurring in a middle-aged woman, and accompanied by a palpable tubal mass.

Prognosis.

The after-results in the cases reported was not good, but in most cases the character of the growth was not recognized till after the operation was finished, and consequently a radical operation had not been performed.

Treatment.

The treatment of the condition consists in the removal of the uterus and both tubes and ovaries, with as much of the pelvic peritoneum as possible.

Sarcoma of the Fallopian Tube is of great rarity.

Chorion-Epithelioma occurring as a primary growth in the tube has been recorded on more than one occasion.

Tuberculosis of the Fallopian Tube, see p. 277.

SECTION VIII.—EXTRA-UTERINE PREGNANCY

CHAPTER LVIII

TUBAL PREGNANCY

EXTRA-UTERINE pregnancy is not an uncommon condition. In the large majority of cases the ovum is embedded in the tube, and in a very small number of cases in the ovary. The occurrence of primary abdominal pregnancy—*i.e.*, embedding of the ovum in any tissue other than the uterus, tube, or ovary—has never been proved. The most common site of tubal pregnancy is in the ampullary part of the tube; a less common site is in the isthmus, and less common still in the interstitial part of the tube. An extra-uterine pregnancy which was originally in the ampullary part of the tube may become tubo-ligamentary—*i.e.*, contained in a sac formed partly by the tube and partly by the broad ligament—and later may become a "secondary abdominal pregnancy," by the rupture of the part of its sac formed by the broad ligament.

CAUSE.

It must be admitted that we are ignorant of the cause or causes of extra-uterine pregnancy, in spite of much work that has been done on the subject. Some of the theories that have received most support must be considered briefly. It is believed that impregnation normally takes place in the tube, and that the ovum is then carried on into the uterus, where it becomes embedded. One of the oldest theories was that salpingitis was the cause, the explanation being that by loss of the ciliated epithelium of the tubal mucous membrane the spermatozoa were allowed to enter the tube, and the ovum was not helped in its passage along the tube. It was thought at that time that an ovum could not become implanted on a mucous membrane whose surface was intact. The induration of the tubal muscle was also supposed to diminish the amount of peristaltic action which might propel the ovum towards the uterus. Another way in which salpingitis was supposed to bring about lodgment of the impregnated ovum in the tube was by adhesion between neighbouring folds of

mucous membrane, so that culs-de-sac were formed from which the ovum could not escape. The chief argument against salpingitis being the cause is that in many cases there is no evidence of inflammation in pregnant tubes, the changes that are found in the wall of the tube being due to increased nutrition, and not to inflammation.

"External wandering" of the ovum—that is, wandering in the peritoneal cavity external to the uterus—was also considered to be the cause of extra-uterine pregnancy. It is often noticed that the ovary on the side corresponding to the pregnant tube does not contain a recent corpus luteum, while there is a recent corpus luteum in the other ovary. As the ovum in these cases had to make a longer journey than usual, it was suggested that it became too large during this journey to pass through the tube. If one talks of the ovum in such a case as having to cross from one side of the pelvis to the other, this theory seems at first to be of some weight; but the distance between the abdominal ostia of the two tubes is actually not great, and we have no proof that the passage of an ovum from the right ovary into the left tube, or *vice versâ*, is really much delayed. Cases are not rare in which a woman with only one ovary and one tube on opposite sides, the others having been removed by operation, has a normal intra-uterine pregnancy.

Unusual length of the tubes, kinking, and partial occlusion of the lumen by tumours, have also been considered to be causes of tubal pregnancy, by bringing about delay in the passage of the ovum through the tube. The result of delay may be that the ovum becomes too large to pass through the tube, or that the development of the trophoblast may be so far advanced that the embedding of the ovum begins.

The theory which receives most support at the present day is that the ovum is delayed in the tube for some reason which is as a rule unknown, but that possibly, in some cases, it is caught in a cul-de-sac. Diverticula can be seen in many tubes, opening into the lumen and running for a longer or shorter distance in the wall of the tube, parallel with the lumen, though it is seldom that a specimen can be obtained in a sufficiently early and undamaged condition to afford absolute proof that the ovum has been caught in such a diverticulum. The probability is that there is no one cause for extra-uterine pregnancy. Cases of repeated tubal pregnancy are common, but so also are cases in which a patient has a normal pregnancy after, or both before and after, a tubal pregnancy. Again, coexisting intra- and extra-uterine pregnancy is not very uncommon. In a certain percentage of cases there has been rather a long interval of sterility before the extra-uterine pregnancy occurred.

Anatomy of the Pregnant Tube.

It is assumed that the student understands the normal process of the embedding of the ovum in the uterus (see "Midwifery," pp. 14, 16). The difference between the embedding of the ovum in the uterus and that in the tube is explained by the anatomical difference in the structure of the two organs. In the uterus there is a thick vascular membrane, the endometrium, into which the ovum can sink. The endometrium undergoes decidual changes, and increases in thickness to a considerable extent. In it can be formed the intervillous space; it contains very numerous capillaries, and small arteries and veins. The bleeding that occurs when these are

Fig. 180. Tubal Pregnancy.

A drawing from a microscopical section, showing *VV*, villi; *S*, syncytium; *L*, Langhans' cells; *D*, tube wall.

opened up by the trophoblast is small in amount, and not a source of danger to the ovum. In the tube, on the other hand, except in the folds of mucous membrane, which are not large enough to contain the growing ovum, there is very little, if any, connective tissue between the surface epithelium and the muscle, and this connective tissue does not undergo decidual changes early in pregnancy. In healthy tubes the epithelium between the folds lies in places directly on the muscle, and nowhere is there more than a very thin layer of connective tissue separating the epithelium from the muscle.

If an ovum becomes embedded in a fold of the mucous membrane, it will very soon break through one side of the fold into the

lumen of the tube. If it becomes embedded between two folds, it soon begins to burrow into the muscle. Although the connective-tissue cells of the tubal folds and the few scattered connective-tissue cells between the epithelium and the muscle become swollen, and sometimes—usually late in pregnancy, at a time when they can be of no use to the growing ovum—assume well-marked decidual characters, there is no decidual formation comparable with that which occurs in the uterus. A partition sheet is raised up by the growing ovum between it and the lumen of the tube, called the

FIG. 181. TUBAL PREGNANCY.

Note the intramuscular site of the ovum. The lumen is seen below the ovum. (Semi-diagrammatic, from a microscopical section.)

"pseudo-capsularis," as it bears the same relation to the ovum as the decidua capsularis which is found in early uterine pregnancy. This pseudo-capsularis, or partition sheet, consists of tubal mucous membrane and a certain amount of the internal muscular layer. The ovum lies in a cavity in the tube wall, bounded on the outer side by the peritoneum and a layer of muscle, on the inner side by the tubal mucous membrane and an incomplete sheet of muscle (Fig. 181).

As the ovum grows the tissues of the tube wall become looser and more vascular, and all the connective-tissue cells—*e.g.*, those

of the intermuscular connective tissue—may become swollen and resemble decidual cells. Even on the peritoneal surface collections of large rounded cells may be seen, but nowhere, except occasionally in some of the folds of the mucous membrane, is a compact mass of decidual cells found. The trophoblast burrows into the muscle. Some of the vessels which it meets are large, and when these are opened up the pressure of the blood-stream is often able to break down the resistance of the fœtal cell mass, with the

Fig. 182.—Tubal Pregnancy. Hæmorrhage round the Ovum.

result that hæmorrhage into the ovum and the tubal muscle surrounding it, a comparatively rare occurrence in intra-uterine pregnancy, is almost the rule in extra-uterine pregnancy, and is the cause of mole formation, tubal abortion, erosion or rupture (Fig. 182).

The uterus undergoes considerable enlargement in cases of tubal pregnancy, in advanced cases becoming as large as, or even larger than a normal pregnancy of two and a half to three months. The endometrium undergoes decidual changes, indistinguishable from those which occur in intra-uterine pregnancy. The decidua

may be thrown off as a cast of the uterus or may come away in fragments, after the death of the ovum (Figs. 183, 184, 185).

Clinical Course.

Most commonly one menstrual period is missed before any symptoms arise, but sometimes severe intraperitoneal hæmorrhage occurs early in the course of tubal pregnancy, not more than three weeks after a normal menstrual period. It is comparatively unusual for a tubal pregnancy to advance beyond six or eight weeks without the occurrence of pain or bleeding, or both. The various terminations that are possible in a case in which the pregnancy is not cut short by operation are—

1. The formation of a tubal mole, with or without tubal abortion.
2. Tubal rupture.
3. Tubal erosion, with possible persistence of the pregnancy even up to term.

The patient may or may not have symptoms pointing to pregnancy. With or without a period of amenorrhœa, she complains

Fig. 183.—Complete Decidual Cast of Uterus, unopened, from a Case of Tubal Pregnancy.

Note the opening at each angle.

of pelvic pain, and of irregular hæmorrhage from the uterus. The bleeding from the uterus is usually small in amount, not more than that lost in an ordinary menstrual period, although cases occur rarely in which bleeding from the uterus is more profuse. The blood is usually dark in colour, and is often described by the patients

as being black or "like coffee-grounds." This discharge may persist for weeks. It may be taken as a rough working rule that, if a patient who is a few weeks or months pregnant complains of a little pain, and a good deal of bleeding from the vagina, the pregnancy is probably intra-uterine; whereas if she has much pain, and little bleeding from the vagina, she very likely has extra-uterine pregnancy. A perfect decidual cast may be passed from the uterus. If there is no bleeding from the uterus in a case of tubal pregnancy, it is probable that the pregnancy is undisturbed—*i.e.*, that the ovum is alive. There may be one or more attacks of very severe pain, accompanied by more or less collapse. The pain may be due to distension of the tube or to uterine contractions, but severe

FIGS. 184 AND 185. . . . HALVES OF A DECIDUAL CAST OF THE UTERUS PASSED . . . ATIENT WITH TUBAL PREGNANCY.

The half on the left shows the shaggy outer surface, that on the right shows the smooth inner surface.

pain is usually due to presence of blood in the peritoneal cavity. The amount of pain varies greatly, but a patient who has had much blood poured out into the peritoneal cavity practically always complains of severe pain.

Tubal Mole.—As has been said above, it is to be expected, from the anatomical structure of the tube, that bleeding should occur into the space between the ovum and its surroundings during the formation of the placenta. If this bleeding is large in amount, the ovum may be so swamped by it that the space between the chorion and the maternal tissues is filled with blood to such an extent that the ovum dies, and the blood clots. Such an ovum surrounded by

blood-clot is called a tubal mole. A mass is formed, commonly the size of a bantam's egg, firm and apparently solid; but on section a thick wall of blood-clot and chorion is found to surround the amniotic space, which is free from blood, and may contain an embryo (Fig. 186). Microscopical sections of the wall show blood-clot containing chorionic villi, more or less degenerate.

A patient who has a tubal mole will probably complain of pelvic pain and discomfort, and loss of dark blood from the uterus. On examination the uterus will be found to be enlarged and firm. In one posterior quarter of the pelvis a swelling will be found, the size of a hen's egg or larger, firm, not freely movable, and not very tender. The mole may be expelled into the peritoneal cavity. If it remains *in situ*, it may be absorbed or may, very rarely, be infected

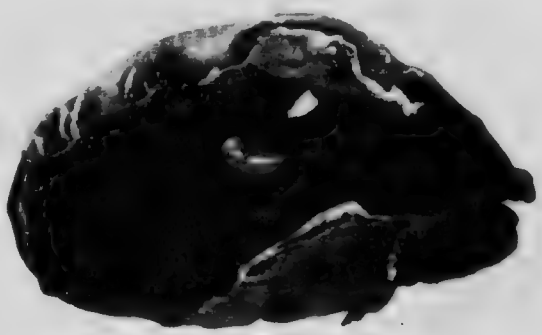


FIG. 186.—COMPLETE TUBAL ABORTION.

The mole was found free in the abdominal cavity. The shrunken seven weeks' embryo is seen lying in the amniotic cavity surrounded by chorion and organized blood-clot.

by the bacillus coli or some other organism. The fact that the ovum has been converted into a mole does not insure the patient against the occurrence of the three dangerous accidents—abortion, rupture, and erosion, which will be considered next.

Tubal Abortion.—Students frequently misunderstand what is meant by tubal abortion, thinking that it means that the ovum passes along the tube into the uterus, and is then expelled. It is theoretically possible that in a case of interstitial pregnancy the ovum might rupture into the cavity of the uterus, and later be expelled; but this must be a very rare occurrence. As was said above, an ovum, which is embedded in the tube, is separated from the lumen by a thin sheet of tissue which is made up of tubal mucous

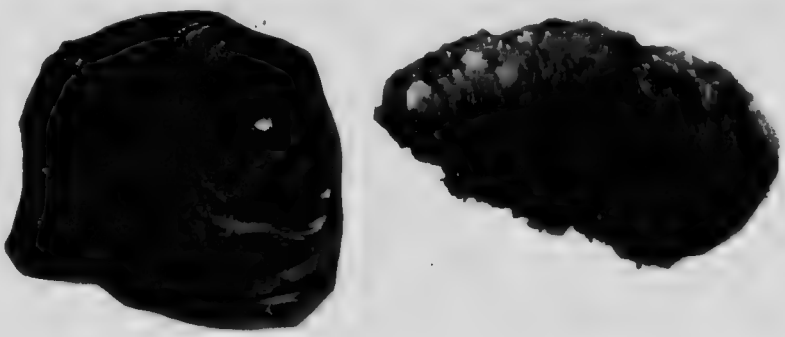
FIG. 187.—RUPTURE INTO THE LUMEN OF THE TUBE, WHICH IS SEEN TO BE FILLED WITH BLOOD.

(Semi-diagrammatic, from a microscopical section.)

FIG. 188.—TUBAL ABORTION.

The mole is seen in process of extrusion through the dilated abdominal ostium.

membrane and a certain amount of muscle. If this partition sheet, or pseudo-capsularis, is ruptured, bleeding will occur into the lumen of the tube (Fig. 187). If the abdominal ostium is open, the blood will run out into the peritoneal cavity. The ovum or mole may be loosened from its bed, and extruded from the tube into the peritoneal cavity, by contraction of the tubal muscle. This is called "complete tubal abortion," while if the ovum or part of it remains in the tube, whilst bleeding occurs through the abdominal ostium, the case is spoken of as one of "incomplete tubal abortion." The amount of bleeding in some cases of tubal abortion is only slight, probably because the ovum has been dead for some time, and there is a good deal of thrombosis in the vessels of the tube. In other cases there may be severe hæmorrhage. If the symptoms point to several recurrent



FIGS. 189 AND 190.—COMPLETE TUBAL ABORTION.

The mole, seen on the right, was lying half in and half out of the dilated fimbriated extremity, and became completely detached as soon as it was handled.

intraperitoneal hæmorrhages, of moderate severity, a diagnosis of incomplete tubal abortion may be made with a fair amount of confidence (Figs. 188, 189, 190).

Tubal abortion is likely to occur in cases in which the ovum is embedded in the ampullary part of the tube. It never occurs in cases in which the ovum is embedded in the isthmus, as in these cases early intraperitoneal rupture is the usual termination of the pregnancy. The breaking through of the pseudo-capsularis is due, not to the destructive action of the trophoblast, but to increased tension brought about by bleeding into the ovum. The trophoblast and the young villi which are seeking maternal blood-vessels for the nutrition of the ovum are much more developed on the side remote from the lumen. In other words, the chorion frondosum will be on the surface of the ovum remote from the

lumen, the chorion lævo on the surface towards the lumen. In most cases of tubal abortion, the ovum has been converted into a mole before the abortion occurs. For tubal abortion to take place the abdominal ostium must be open: if bleeding occurs into the lumen of a tube the abdominal ostium of which is firmly closed, abortion cannot take place. In these circumstances the progress of the case will depend upon the amount of bleeding and the extent of destruction of the wall of the tube by the action of the trophoblast. If the amount of blood poured out into the tube is not great, and the tube-wall is not much weakened, the tube will become distended with blood—a hæmatosalpinx—with the mole still contained in its cavity in the wall, and absorption will take place slowly if no operation is performed. If, however, a large amount of blood is poured out into the lumen of a tube which has been weakened by the action of the trophoblast, the increase of tension, due to the closure of the abdominal ostium preventing the escape of blood, will cause rupture of the tube. The beginning of a tubal abortion—*e.g.*, the breaking through of the partition sheet—might be termed internal rupture, as opposed to external rupture, which will be considered next.

Tubal Rupture.—The term tubal rupture has been used for all cases in which a breach of surface in the tube has occurred accompanied by bleeding. It is better, however, to reserve the term for those cases in which the tube wall, weakened by erosion by the trophoblast, bursts as the result of a sudden increase of tension in the tube. This is commonly associated with the opening up of a large vessel, and is followed by severe intraperitoneal bleeding. In rare cases the rupture takes place through the small area of tube wall which has no peritoneal investment—*i.e.*, into the tissues of the broad ligament. The predisposing cause in all cases is the destructive action exerted by the trophoblast, which may burrow through the whole thickness of the muscular wall until the peritoneum is reached. It may even destroy the peritoneal coat. Careful examination of the peritoneal surface of a pregnant tube may reveal the presence of one or more spots where the peritoneum has been destroyed and a protective layer of lymph has been deposited, so-called "concealed ruptures" (Figs. 195, 197).

When a large vessel is opened up by the trophoblast, the resulting bleeding may be sufficient to break through a part of the tube wall which has already been weakened by the action of the trophoblast. In such a case blood may occasionally be seen spurting through the hole in the tube wall. Rupture of the tube may be due to a straining effort on the part of the patient, or pressure on the tube during

FIG. 191.—TUBAL RUPTURE.

A well-formed placenta and a twelve weeks' fœtus are seen hanging out of a large rent in the posterior wall of the right tube, about 2 inches from the fimbriated extremity.

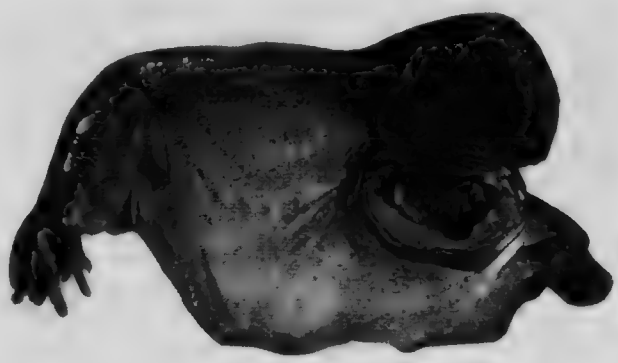


FIG. 192.—ISTHMIAL PREGNANCY.

A specimen removed post mortem from a woman who died of intraperitoneal hæmorrhage three months after a normal labour. The three weeks' gestation sac in the isthmus of the tube has been laid open and its halves separated. The rupture from which the fatal bleeding occurred was a minute perforation.

FIG. 193.—TUBAL RUPTURE.

Fatal rupture of a four weeks' gestation sac in the isthmus of the left tube. The decidual lining of the uterus is well seen.

FIG. 194.—TUBAL EROSION.

The embryo of about three weeks is seen hanging in its intact amnion from a rupture about 1½ inches from the abdominal ostium.

bimanual examination, either by pressure alone or by the increased tension due to fresh bleeding into the gestation sac caused by the pressure. This class of rupture, due to increase of tension by the action of the patient or her doctor, includes rupture of the tube which contains a mole, in which trophoblast action has ceased, although its result, weakening of some part of the tube wall, persists. It is found in some of these cases, which may be described as rupture due to external causes, that the abdominal ostium is firmly closed.

FIG. 195.—INTRAPERITONEAL RUPTURE.

The lumen of the tube is seen below the ovum. (Semi-diagrammatic, from a microscopical section.)

The amount of bleeding is likely to be greater in tubal rupture than in abortion, because thrombosis of the vessels is less probable in the former than in the latter.

Severe Intraperitoneal Hæmorrhage due to Tubal Rupture or Abortion.—In a typical case the clinical picture is definite, and a diagnosis can usually be made with confidence. The patient has evidently had some severe intra-abdominal accident which has caused pain, fainting, or collapse, followed by distension of the abdomen, and in

some cases by vomiting, and she shows signs and symptoms of the loss of a large quantity of blood. She is blanched, and her pulse is small and rapid—120 to 140 per minute. The temperature is probably subnormal, and the skin may be clammy. A characteristic "restlessness" is often seen, the patient rolling over from one side to the other, tossing her arms at the same time with a groaning sigh. If the amount of blood lost is very great, she may complain of partial loss of sight. The whole of the abdomen is usually distended to a greater or less degree, and it is hyperæsthetic all over. There is no localized area of tenderness, as in appendicitis, but the whole subumbilical area is acutely sensitive. If the patient is seen soon after the hæmorrhage has taken place, there will probably be nothing to be made out by examination of the abdomen, except that the skin is white: the abdomen, without being tense, is tumid, and is hyperæsthetic; no lump will be felt. On vaginal examination a little dark blood will be seen coming away, and it may be possible to say that the uterus is enlarged and that there is a feeling of fullness in Douglas's pouch, and a small swelling may be felt in one or other posterior quarter of the pelvis. It is important for the student to realize that there will be no tense bulging in the posterior fornix at this early date.

If the fertilized ovum becomes embedded in the isthmus of the tube, rupture is likely to occur early, as there is so little tissue to accommodate the ovum and the wall is soon perforated by the trophoblast (Figs. 192, 193). Tubal abortion cannot occur in an isthmial pregnancy, and rupture is the inevitable consequence.

Pelvic Hæmatocele.—If the bleeding is not fatal, and the patient is not operated on, a pelvic hæmatocele will be formed. The blood gravitates into Douglas's pouch and forms a mass of clot filling the pelvis, and, if it is sufficiently large, rising up into the abdomen. The blood becomes encysted—*i.e.*, its presence causes sufficient localized inflammation to wall it in and limit it, so that it is fixed and cannot change its position with the movements of the patient. It is roofed over by omentum and adherent coils of small intestine, while anteriorly it is in contact with the uterus, broad ligaments, bladder, and also, if it is large enough, the lower part of the anterior abdominal wall. Its floor is formed by Douglas's pouch, and behind it is in contact with the rectum and the posterior wall of the pelvis on each side of the rectum. In some cases the blood occupies the space between the uterus and the bladder, but it usually pushes the uterus upwards and forwards against the symphysis pubis and bladder. Abdominal examination, if there is a large amount of blood-clot, shows the presence of a tender fixed swelling which is

elastic or feels as if it contains fluid. Light percussion over the upper part of the tumour will often elicit a resonant note, a useful point in differential diagnosis (Fig. 196).

On vaginal examination, the cervix is found to be pushed forwards and upwards, sometimes almost out of reach; Douglas's pouch is occupied by a tense swelling which may bulge downwards to a considerable extent; fluctuation can sometimes be obtained between the fingers in the posterior fornix and the other hand on the abdomen. If the body of the uterus can be distinguished apart from the swelling,

Fig. 196.—Large Hæmatocele (Diagrammatic) filling the Pelvis and reaching up into the Abdomen.

The uterus is pushed upwards and forwards. The bladder is drawn wrongly—its cavity should be above the symphysis.

it will be found to be enlarged. If the cervix is pushed much upwards by a large amount of blood in Douglas's pouch, retention of urine may be caused by the lengthening of, and pressure on, the urethra.

Later on, when absorption of the blood has begun, the contents of Douglas's pouch will have a lumpy irregular consistence which may be very characteristic, as also is the sensation gained by the finger that the posterior vaginal wall will not slip over the mass. The temperature is often raised slightly in cases of pelvic hæmatocele.

If the patient is not operated on, the probability is that the blood will be absorbed, though this may be a very slow process,

the patient being an invalid for several weeks or months with abdominal and pelvic discomfort, and slight bleeding from the uterus. Suppuration may occur, due to infection with bacillus coli or some other organism, but is by no means common.

In cases in which the amount of blood lost is only slight, there is a leakage or trickling rather than a rush of blood. A hæmatocele in Douglas's pouch may be formed, as described above, but smaller. This is probably the commonest source of a hæmatocele such as is found at the present day, since in cases of severe intraperitoneal hæmorrhage an operation is usually performed before there is time for a hæmatocele to be formed.

Sometimes one of two rather rare conditions, called respectively *peritubal* and *paratubal* hæmatoceles, may occur. In the former a small quantity of blood oozes out of the abdominal ostium and clots there. As further bleeding occurs, this first clot is expanded without being broken through, and gradually by a process of repeated small hæmorrhages a swelling is formed, sometimes as large as a fœtal head, surrounding the abdominal ostium. In some cases the swelling may contract no adhesions, and may produce physical signs suggestive of an ovarian tumour. An apt description of the growth of a peritubal hæmatocele is that it resembles the enlargement of a soap bubble. A paratubal hæmatocele is formed in the same way, except that the blood here exudes from an erosion or leaking fissure in the wall of the tube, so that the hæmatocele is formed along the tube and not around its extremity.

Extraperitoneal Rupture.—In the large majority of cases rupture or erosion of a pregnant tube occurs into the peritoneal cavity; in comparatively rare cases it takes place into the broad ligament (Fig. 197). Bleeding is then likely to be less in amount, as it is taking place into a finite space. If the ovum is killed, the blood clots in the broad ligament, forming what is known as a pelvic hæmatoma. It is probable that in all cases of extraperitoneal rupture the ovum is killed, but that with erosion it may continue to develop for a time.

Tubal Erosion with Possible Persistence of the Pregnancy even up to Term.—Cases in which the breach of surface is caused only by perforation by the trophoblast, without severe hæmorrhage and serious amount of separation of the ovum, may be termed "erosion" of the tube. A communication may be thus made between the intervillous space and the peritoneal cavity, and some blood escapes, but not in such quantity or with such rapidity as in cases of "rupture." It is theoretically possible for the developing

ovum to remain in the tube undisturbed until term, but this is an infinitely rare occurrence. Mole formation and tubal abortion preclude the possibility of persistence of the pregnancy, and in most cases rupture also brings the pregnancy to an end. Rarely, however, in cases of erosion of the tube, if the amniotic sac is not ruptured and the separation of the chorion from its bed is

FIG. 197. – EXTRAPERITONEAL RUPTURE.

not too extensive, the pregnancy may continue. If the erosion is intraperitoneal (Fig. 194), and these conditions are satisfied, it is possible for the villi of a part of the chorion which has been detached from the tube to become attached to some part of the abdominal contents, most likely omentum, sometimes intestine or pelvic peritoneum, which then act as a portion of the maternal part of the

placenta, while the tube continues to form the greater part. In these conditions it is possible for the pregnancy to continue to term, although there is still risk of bleeding due to separation of some part of the placenta.

If the primary erosion of the tube is extraperitoneal—*i.e.*, into the tissues between the layers of the broad ligament, a rare occurrence—it is possible that the chorion is not much disturbed. The

FIG. 198.—TUBO-LIGAMENTARY SAC, WITH SECONDARY RUPTURE INTO THE PERITONEAL CAVITY.

The sac is made up of the right tube and the mesosalpinx.

ovum may then go on developing, one or other layer of the broad ligament, more usually the posterior, being stretched as the ovum grows. Less commonly the gestation sac increases in size at the expense of the anterior layer of the broad ligament, the peritoneum being stripped up until the sac may be in contact with the anterior abdominal wall without any peritoneum intervening. From the situation of the gestation sac, the case is spoken of as being a tubo-

ligamentary pregnancy. After a time the part of the broad ligament covering the ovum will probably give way, what is called "secondary intraperitoneal rupture" occurring (Fig. 198). Should a large vessel be implicated in the rupture, there will be severe, sometimes fatal, hæmorrhage. There is not necessarily, however, any great amount of bleeding, sometimes, apparently, none at all: and in such a case, provided that the amnion is still intact, the pregnancy may progress until term.

In some such cases there have been no symptoms whatever to suggest to the patient that the pregnancy was in any way

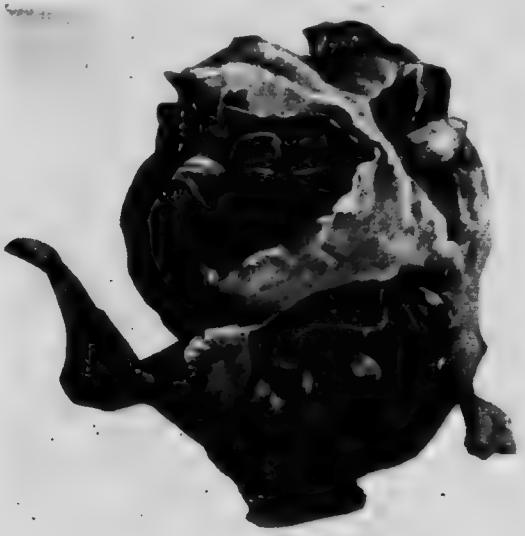


FIG. 199.—INFECTION OF A FULL-TIME EXTRA-UTERINE GESTATION SAC.

A large abscess sac removed post mortem, containing the bones of a full-time extra-uterine fœtus. A sinus had formed at the umbilicus, through which some of the bones were discharged.

abnormal. When term arrives, what is called "mock labour" occurs—*i.e.*, the patient is seized with labour pains due to contractions of the uterus, and there may be a certain amount of blood-stained discharge. These pains may continue for twenty-four hours or more. Very soon after this the movements of the child cease; it dies at or soon after the mock labour. Thrombosis of the placenta gradually occurs. Various things may then happen to the ovum and its sac:

(*a*) It may remain practically unchanged except for absorption of the liquor amnii and mummification of the fœtus, giving rise to

no symptoms and no discomfort except that involved by a permanent enlargement of the abdomen.

(*b*) Infection of the sac may occur, giving rise to a more or less severe toxæmia, sometimes followed by the discharge of bones *per rectum*, or through a sinus in the abdominal wall (Fig. 199). The

Fig. 200.—A Lithopædion from a Full-Time Right-Sided Tubo-Ligamentary Pregnancy.

It was carried for nine years, causing little inconvenience. After nine years the left tube became pregnant. The head of the lithopædion fixed in the brim of the pelvis, caused severe pain at three months, when the left tube and uterus were unable to spread upwards as they increased in size.

patient usually dies of the effects of the prolonged suppuration, unless an operation is performed.

(*c*) There may be formation of a lithopædion—*i.e.*, deposit of lime salts—at first in the skin, later in the deeper tissue of the fœtus (Fig. 200). This change may also occur in much smaller fœtuses in cases in which the pregnancy came to an end before term, without causing fatal hæmorrhage. A lithopædion may be carried about for very many years, causing practically no symptoms, or may give rise to trouble due to formation of adhesions.

CHAPTER LIX

TUBAL PREGNANCY—*Continued*

Diagnosis.

The student must be warned that a mere diagnosis of extra-uterine pregnancy is not enough. An attempt must be made at diagnosing as nearly as possible the actual condition that is present—*e.g.*, the presence of a living ovum in the tube, the presence of a tubal mole, severe intraperitoneal hæmorrhage, slight hæmorrhage with a dead ovum, etc.—for until this has been done it is impossible to decide what is the correct method of treatment.

1. **Cases in which the Tube contains a Living Ovum.**—These are seen comparatively rarely, because, as a rule, they are not accompanied by external bleeding or by much pain. A patient who thinks herself to be a few weeks or months pregnant may come complaining of pain. The breasts, especially in a first pregnancy, may show some signs of activity; the cervix is somewhat softened, and is bluish; the body of the uterus is distinctly enlarged, but not enough to correspond with the date of the pregnancy; Hegar's sign cannot be obtained, and the uterus feels firm, more resistant, less elastic, and less nearly globular, than in intra-uterine pregnancy. There is probably no blood to be found in the vagina, unless intraperitoneal hæmorrhage has occurred as a result of tubal erosion. If the ovum is still alive, it is often, if not always, found that there is no detachment of the decidua from the uterus and no uterine hæmorrhage. In one or other posterior quarter of the pelvis is found a rounded swelling, soft and rather tender, probably not freely movable. The diagnosis lies between tubal pregnancy and normal intra-uterine pregnancy with a small ovarian cyst. A differential diagnosis can be made only by a careful bimanual examination, noting exactly the condition of the uterus. If the patient is stout or very tender, an anæsthetic may be necessary, and great care must be taken not to press hard on the pelvic swelling, as, if it is a pregnant tube, too violent squeezing may cause rupture. If the pregnancy is extra-uterine, the uterus, although enlarged, will not be so large as at the same date in a normal pregnancy, and will feel firmer and less elastic.

Hegar's sign will, necessarily, be absent. In many cases, when the diagnosis of the tubal pregnancy has been established, doubt may be felt as to whether the tube contains a living ovum or a mole.

2. **Tubal Mole.**—If the ovum has been converted into a mole, there will usually be discharge of a small quantity of dark blood from the uterus, sometimes accompanied by the passage of a decidual cast. The most likely mistake in such a case is that of thinking that a miscarriage is threatened. Careful bimanual examination may show that neither the uterus nor the swelling at the side of it is large enough to contain a living ovum of the size that would be expected from the period of amenorrhœa. The certain diagnosis that the tube contains a mole is easier in cases in which all acute symptoms have ceased some weeks before the patient is seen, the swelling being too small to correspond with a history of ten to twelve weeks' amenorrhœa. In cases in which there is some doubt, gradual diminution in the size of the tubal swelling during the first two weeks after the patient is first seen will prove that the diagnosis of tubal mole was probably correct. It is sometimes difficult, if not impossible, to make a certain diagnosis between recent miscarriage in a patient with salpingo-oöphoritis, and tubal pregnancy ending in mole formation, though the condition of the cervical canal may suggest that it has been dilated recently. Acute torsion of a small ovarian tumour, causing threatened miscarriage, will produce a condition which may be mistaken for tubal pregnancy; but as a rule in such a case careful bimanual examination establishes the fact that the uterus is pregnant, and the abdominal signs and symptoms are those of irritation rather than those of hæmorrhage.

The most frequent error is to confuse a unilateral chronic salpingitis or pyosalpinx, especially if it is accompanied by a blood-stained discharge, with a tubal gestation. The history is the most important guide, but if this is not characteristic the similarity of the physical signs in the two conditions may make differentiation difficult if not impossible.

3. **Severe Internal Hæmorrhage.**—It may be said at once that in the majority of cases of severe internal hæmorrhage, due to rupture of the tube or to tubal abortion, diagnosis is easy. The most common mistake is that of attributing the condition to acute torsion of the pedicle of an ovarian tumour. Some cases are mistaken for perforation of the appendix or of a gastric or duodenal ulcer. The physical signs of all these conditions may be alike on superficial examination, but there is no evidence of sudden loss of a large quantity of blood in any of them, except tubal pregnancy; and even

if there has been no period of amenorrhœa to point to a correct diagnosis, the slight loss of blood from the uterus ought as a rule to suggest it. It is quite possible that the enlargement of the uterus may be too slight to be appreciable when the abdomen is distended. The presence of free fluid may be detected sometimes, though in many cases percussion fails to reveal the presence of a large quantity of free blood in the peritoneal cavity—*i.e.*, there is dullness in the flanks, but the sign of shifting dullness cannot be obtained, as the blood has already begun to clot, and cannot move as freely as ascitic fluid. It is rare for a twisted ovarian tumour to be too small to be detected on bimanual examination.

4. Pelvic Hæmatocele.—Careful abdominal and bimanual examination will, in the case of a large hæmatocele, establish a diagnosis of encysted fluid. The history, temperature-chart, and condition of the patient, will usually point to the fluid being blood rather than pus or serum. There is usually a slight rise of temperature for a few days with a hæmatocele. If there is a large amount of blood in the peritoneal cavity, the patient must show signs of anæmia. A large hæmatocele may be mistaken for an ovarian cyst which has caused localized peritonitis after acute torsion of its pedicle; but the history, the anæmia, and the findings on percussion over the tumour, will usually serve to indicate that the swelling is due to the presence of encysted blood, and not to an ovarian cyst. Light percussion over the upper part of a large hæmatocele produces a resonant note which helps to prove that intestine forms part of the wall of the swelling. There is usually some suprapubic tenderness as long as the hæmatocele persists. The enlargement of the uterus, if it can be made out, and the discharge of dark blood from the uterus, also help to establish the diagnosis. If the hæmatocele is small, and the history is not typical, there may be risk of mistaking the condition for pelvic inflammation; but the enlargement of the uterus ought to suggest the correct diagnosis.

To mistake a hæmatocele for a retroverted uterus with threatened or incomplete miscarriage is a fairly common error especially if it is accompanied by retention of urine. It is also a very dangerous one, as dilatation and curetting or attempts to push up the swelling in Douglas's pouch are likely to be followed by fresh intraperitoneal bleeding due to breaking down adhesions and reopening vessels which had been sealed. If the history is taken carefully, a suspicion is usually roused as to the true nature of the condition present. Vaginal examination will show that the cervix points forwards in the case of a retroverted uterus, and backwards if Douglas's pouch is occupied by a hæmatocele. The posterior

vaginal wall can be made to move freely over the surface of a retroverted pregnant uterus, while it seems to be blended with the mass of clotted blood. Bimanual examination will reveal the fact that the body of the uterus lies in front of a hæmatocele, while it is absent from its usual situation in a case of retroversion of the uterus. The use of a uterine sound to help in the diagnosis is inadmissible. In any case of doubt an anæsthetic must be given, when a satisfactory bimanual examination can nearly always be made.

Decidual Casts of the Uterus.—In a certain percentage of cases of extra-uterine pregnancy a decidual cast of the uterus is passed. A perfect specimen is a triangular bag about 2½ to 3 inches in length, and about 2 inches broad at the upper end, with an opening at each angle corresponding to the uterine ends of the Fallopian tubes and to the internal os. The outer surface is more or less shaggy; the inner is smooth. The membrane is thick and tough, unless it has been lying in the vagina long enough to become soft through decomposition. On microscopical examination well-developed decidual cells are seen. Such a cast has to be diagnosed from an early abortion, from a dysmenorrhœal cast, and from a cast of vaginal mucous membrane; also, theoretically, from a cast of the bladder, although practically the presence of a severe degree of cystitis suggests the correct diagnosis in the last case. If only a portion of the decidua is presented for examination in a case of uterine abortion, microscopical examination will not allow of a distinction being made from a decidual cast passed from a case of tubal pregnancy: but if the ovum has come away with the decidua, the microscope will reveal chorionic villi. A bimanual examination ought to settle the diagnosis (Figs. 180, 183, 184, 185).

A dysmenorrhœal membrane, if perfect, will be seen to be smaller and thinner than a decidual cast. Under the microscope the stroma cells, though enlarged, will be much smaller than well-formed decidual cells, and the characteristic changes in the glands will be absent. If doubt is felt as to whether the enlargement of the stroma cells of the endometrium is enough to justify their being called decidual, the section should be compared with a typical one of decidua. The history and results of bimanual examination again will confirm the diagnosis. A cast from the vagina is thinner, more translucent, and more resistant, than a cast from the uterus. Under the microscope stratified squamous epithelium will be seen, easily distinguishable from endometrium.

CHAPTER LX

TUBAL PREGNANCY—*Continued*

Treatment.

In discussing the treatment of extra-uterine pregnancy the following conditions must be considered:

1. Presumably living ovum
2. Tubal mole.
3. Intraperitoneal hæmorrhage.
4. Hæmatocele.
5. Cases of advanced pregnancy.

It may be laid down, as a working rule, that all cases except those in which the fœtus is obviously dead, or cases of advanced pregnancy, should be operated on as soon as the diagnosis is made.

1. **Presumably Living Ovum.**—If diagnosis of an extra-uterine pregnancy with a living ovum is made, an operation should be performed as soon as is feasible, except, possibly, in the rare event of the pregnancy having already reached seven or eight months. In that case some authorities would advise postponement of the operation until at least two or three months after the occurrence of mock labour, because operation on an advanced extra-uterine pregnancy with a living ovum may entail great risk from hæmorrhage. This matter will be referred to later. The objection to this method is that rupture of the sac with severe hæmorrhage may occur at any moment, although it is less likely during the last two or three months than at an earlier period. In all other cases the risk of operating is less than that of leaving the patient alone. The tube should be removed by itself if possible; there is no sense in removing a normal ovary simply because the tube attached to it is pregnant. The operation usually presents no difficulties unless the placenta is attached to other organs than the tube, as will be discussed later.

2. **Tubal Mole.**—The treatment here depends on the symptoms. If there are none beyond the feeling of discomfort in the pelvis and a slight amount of uterine hæmorrhage, and the tumour is not increasing in size, the patient may be "watched"—*i.e.*, kept in

bed under observation—in the hope that the mole will be absorbed. It must be emphasized that this non-operative treatment can be advocated only after expert advice has been taken. A certain diagnosis that the tube contains a mole—*i.e.*, a more or less inert mass made up of a dead ovum and blood-clot—can be made only in cases in which all acute symptoms have ceased and the tubal tumour is too small to contain a living ovum of the size that would be expected from the length of the history, or cases in which the tumour is decreasing in size. If, on the other hand, there is evidence that bleeding is still going on or is recurring, or there is any doubt as to the death of the ovum, the abdomen should be opened and the tube and blood-clot removed. If fresh bleeding, due to rupture or abortion, takes place while the patient is being treated by the expectant method, she will have severe abdominal pain, the pulse-rate will increase, and the tumour will become larger. These symptoms and signs call for immediate operation. There is always a possibility that an operation may have to be performed at very short notice in a case of tubal mole, so, as a general rule, it is better to operate at once if the patient is going to remain in her own home; while operation may be postponed until, if ever, it becomes necessary, if she elects to go to a nursing home or a hospital.

3. **Severe Intraperitoneal Hæmorrhage.**—A patient with severe internal hæmorrhage from a pregnant tube will not necessarily die if no operation is performed; but in some cases the first hæmorrhage is fatal, and in others recurring hæmorrhage would kill her. As it is impossible to prophesy that the bleeding will not recur in such a case when it seems to have stopped, there is no doubt that immediate operation is the best treatment in all these cases. If none of them were operated on a certain percentage would die, and those that recovered would do so only after a long and tedious period, during which the blood-clot was being absorbed. If, on the other hand, all such patients are operated on, the mortality-rate is much lowered, and all those who recover are spared the laborious process of absorbing a pound or two of blood-clot. Although there is practically only one opinion—namely, that every case of severe internal hæmorrhage should be operated on—there is a difference of opinion as to the time at which the operation should be performed. Most operators prefer to operate as soon as possible, however bad the patient is; but some prefer to wait for twelve to twenty-four hours if the bleeding seems to have stopped, so that she may have a chance of rallying before the operation. In the rare cases in which it may be thought best, for some special reason, to delay operation for a few hours,

the pulse-rate should be counted several times at intervals of half an hour. If the pulse-rate is going down or is stationary, it may be safe to wait. Theoretically it might be worth while to wait for the patient to rally, but it is found in actual practice that the very large majority of patients recover if operated on immediately, however apparently desperate their condition may be from sudden severe loss of blood. This delay is safe only if the patient is in a nursing home or hospital, as fresh hæmorrhage may occur and necessitate immediate operation. When the abdomen is opened, no time must be lost in mopping up the blood; but the uterus must be sought for at once, and pulled into the wound and the tubes and cornua examined for the source of the bleeding. As soon as the bleeding has been stopped by removal of a tube or excision of a uterine cornu, saline solution should be injected into a vein or into the subcutaneous tissue, if the patient's condition demands it. A warning against injecting saline solution in any case of hæmorrhage before securing the bleeding point should be unnecessary, as a moment's consideration will show that this will only result in washing the blood out of the bloodvessels. When the bleeding has been stopped, the blood and clots should be removed from the abdominal cavity by gauze sponges or swabs. When the greater part of the blood has been removed, time will be saved by pouring large quantities of warm saline solution (temperature 105° F.) into the abdomen, which causes the remaining clots to float to the surface. When the fluid is only pink, the abdomen is closed with a pint or two of saline solution inside. It is remarkable with what rapidity these patients recover even when their condition at the time of operation seemed almost desperate. It is not uncommon for such a patient to have a fairly high degree of pyrexia for the first two or three days after the operation, but this need not cause anxiety. It is probably due to the absorption of blood from the peritoneal cavity.

In the case of a ruptured interstitial pregnancy, it is usually possible to excise the ruptured cornu and to leave the rest of the uterus. If, on the other hand, the pregnancy has advanced to a later date than usual before the occurrence of rupture, the uterus may be torn so extensively that hysterectomy must be performed.

4. **Hæmatocele.**—If the hæmatocele is large, there can be no doubt that the blood should be removed by operation. If it is left to be absorbed, the patient will be an invalid for two or three months; whereas if she is operated on, she will need only two or three weeks in bed. Absorption must necessarily be a slow process, as the circulation by which it is effected is confined to the periphery of the mass of blood-clot. Operation by the abdominal route is best, as it is

possible then to see exactly what is to be done, and to remove the tube if necessary. Formerly these cases were treated by vaginal incision, but occasionally fresh hæmorrhage from a tube whose torn vessels were not securely sealed by thrombosis necessitated tight plugging of the hæmatocele cavity or immediate abdominal section. If the hæmatocele is small, and the history is one of long standing, it may be left to be absorbed, no operation being performed unless fresh bleeding or suppuration occurs. In the latter case, a comparatively rare occurrence, evacuation by a vaginal incision followed by drainage is the correct treatment.

5. **Cases of Advanced Pregnancy.**—If the ovum is still alive during the second half of pregnancy, operation is fraught with a considerable risk of hæmorrhage when the placenta is separated, as this organ may be attached to various structures *e.g.*, omentum and pelvic peritoneum, which, unlike the uterine muscle, cannot retract when the placenta is separated. Sometimes the attachments of an extra-uterine placenta can be treated in much the same way as the pedicle of an ovarian cyst, with no fear of hæmorrhage. If, however, the placenta has a broad flat attachment to tissue which cannot be ligatured or sutured, it may be safest to leave it *in situ*, "marsupializing" the sac. By "marsupialization of the sac" is meant stitching the edges of the sac to the lower part of the abdominal wound, producing a condition resembling a kangaroo's pouch. The thrombosed placenta may then come away *en masse*, or may break up and be discharged in pieces. If the placenta is separated at the time of operation, it may be necessary to pack the sac firmly with gauze, and to exert pressure on the bleeding surface.

There is danger of infection of the contents of the sac when marsupialization has been carried out. On account of this danger, the abdomen has sometimes been closed with the placenta inside the sac, with the idea of removing the placenta at a later date; but there is some risk of infection after this method also. For these reasons it is safest, when dealing with advanced extra-uterine pregnancy, to keep the patient under observation, but to postpone operation, if possible, until three months have elapsed after the mock labour. The thrombosed placenta may then usually be safely removed. It is not wise to leave the patient longer than this without an operation, since there is a considerable risk of infection of the sac.

On the other hand, infection may occur early, and marked deterioration of health is usual during the period of waiting, whilst not infrequently even two months after mock labour thrombosis may not be sufficient to avoid hæmorrhage.

Hence opinion of late has veered towards immediate operation,

especially as the danger of hæmorrhage is rather decided by the situation of the placenta and the possibility of the excision of its sac, rather than the time after delivery.

A few living extra-uterine fœtuses have been removed by operation at term, but many more fœtuses have been extracted months or years later. According to modern surgical ideas, a woman should not be allowed to retain a large tumour in her abdomen even if it causes her no more than discomfort. In the absence of suppuration the operation of removing the fœtus, its containing sac, and the decomposed placenta, as a rule presents no special difficulties, except that adhesions may be numerous and dense. If, however, suppuration has occurred in the sac, the rest of the abdominal contents must be protected from contamination as far as possible, and it may be best to leave the walls of the sac stitched to the lower part of the abdominal wound.

CHAPTER LXI

RARER VARIETIES OF EXTRA-UTERINE PREGNANCY

Ovarian Pregnancy.—Ovarian pregnancy is very much less common than tubal, being, in fact, still looked on as a rarity. It is explained by a spermatozoon having entered the cavity of a ruptured Graafian follicle from which, for some reason, the ovum has not been ex-

FIG. 201. INTERSTITIAL PREGNANCY.

A ruptured gestation sac of four to five weeks is seen in the interstitial portion of the right tube. The ovum is lying loose.

pelled. Rupture or mole-formation has occurred early in most of the recorded cases. The symptoms and physical signs are those of tubal pregnancy, for which ovarian pregnancy will probably be mistaken, until examination is made of the parts removed at the operation.

Interstitial Pregnancy.—In some cases the ovum is embedded in the interstitial part of the tube, as it passes through the uterine wall. Diagnosis in these cases may be difficult, as the swelling is evidently part of the uterus, and careful bimanual examination would be necessary to prove that this organ had an abnormal shape. In some of these cases rupture takes place later than is usual in ampullary pregnancy, and when it does occur the bleeding may be

FIG. 202.—PREGNANCY IN A RUDIMENTARY UTERINE HORN.

On the left is seen the uterus opened. On the right is the rudimentary horn, which has ruptured, and allowed the escape of part of the placenta and a fœtus of four and a half months, shrivelled by the preserving fluid. Primary rupture in interstitial pregnancy and pregnancy in a rudimentary horn occurs often much later than in tubal pregnancy.

unusually profuse, as the uterine wall is extremely vascular. The treatment is to excise the cornu by a wedge-shaped incision, and leave the rest of the uterus if possible (Fig. 201).

Pregnancy in a Rudimentary Horn.—Pregnancy in a rudimentary uterine horn, although "ectopic," is not really "extra-uterine." A

short account of this condition may, however, be included in a chapter on extra-uterine pregnancy. The comparatively thick muscular wall of an undeveloped uterine horn may go on developing up to term, in which case the patient will probably experience no unusual symptoms. In other cases the sac ruptures, with severe intra-peritoneal hæmorrhage. The bleeding in these cases may be terrible. As a rule the abdomen is opened with the idea of removing a ruptured pregnant tube. The gestation sac, however, is found to be between the fully developed half of the uterus and an unaltered Fallopian tube. If the connection between the rudimentary cornu and the developed half of the uterus is not too intimate, it may be possible to remove the former, and to leave the patient with the fully developed half of the uterus and both ovaries and tubes. In other cases it may be necessary to remove the whole uterus. In a case of pregnancy in a rudimentary horn, the round ligament is seen to be attached on the outer side of the gestation sac, while in tubal pregnancy it is inserted on the inner side of the gestation sac, between it and the uterus (Fig. 202).

Repeated Extra-Uterine Pregnancy.

Cases of repeated extra-uterine pregnancy are common. For this reason it has been suggested that, when an operation is performed for tubal pregnancy, the other tube also should be removed. This suggestion has received little support, most gynæcologists being satisfied with impressing on their patients the importance of a careful examination as early as possible in any subsequent pregnancy.

SECTION IX.—URINARY DISORDERS

CHAPTER LXII

METHOD OF EXAMINING THE URINARY ORGANS

IT is necessary to make a detailed examination of the urethra, urine, bladder, and kidneys, to arrive at a correct diagnosis of the disorders of these organs.

Urethra.—In the first place, the urethra should be examined in a good light. It should be noted if there is redness, discharge, or a growth. The finger should next be passed into the vagina, and the urethra "milked" from behind forwards, and any discharge examined. The discharge should be spread as a thin film on a glass slide, stained, and examined for organisms. If it is thought advisable, further investigation may be made by inoculating a culture medium. If there is a growth at the urethral opening, its nature must be determined.

Urine.—After examination of the urethra, and in the absence of a purulent discharge, the next step is the passage of a catheter. Very great care must be exercised in this procedure, for just as disastrous consequences may follow a faulty technique in this as in any other operation.

The usual form of catheter used for women is made either of glass or of soft flexible rubber. The catheter should be of about the same size as a No. 10 to 12 male catheter, and should be sterilized by boiling.

Method of Passing Catheter.—After the catheter is sterilized, it is placed in a bowl of sterile water. The patient should lie in the dorsal position, with the knees drawn up and separated. The genitals are exposed and isolated by sterilized towels. The labia are thoroughly cleansed, and then separated by the left hand and the vulva swabbed with an antiseptic solution, especial care being bestowed on the vestibule. With the left hand still keeping

the labia apart, the catheter is taken in the right hand and introduced into the urethra. The meatus must be identified and the catheter passed straight in without touching any other part of the vulva. On depressing the distal end, the catheter enters the bladder and the urine flows out of the catheter. The urine can be drawn off into a sterilized bottle for special investigation. During removal of the catheter the opening is closed by the finger to prevent soiling and to save the last few drops which often contain a sediment which should be added to the urine in the bottle.

The passage of the catheter may have revealed some abnormality of the urethra, such as a growth or stone, or possibly an obstruction from some peri-urethral swelling.

In ordinary circumstances it is most unwise to pass a catheter or other instrument into the bladder if there is a persistent discharge. But if there is retention of urine, and every other means has failed to overcome it, a catheter must be passed. Before this is undertaken, the urethra must be thoroughly irrigated with an antiseptic solution, such as permanganate of potash (1 in 5,000), with a glass nozzle with a bell-shield protector allowing the fluid to run freely out of the urethra.

Bladder.—Examination of the bladder may be necessary. During the passage of the catheter some information may have been gained as to the presence of a stone or other foreign body in the bladder, or of some growth which has bled on the passage of the catheter; but it will often be found necessary to make a more detailed examination of the bladder. This can be done by cystoscopic examination.

There are two methods: (1) direct; (2) indirect.

1. *Direct Cystoscopy* is carried out by dilating the urethra and introducing a speculum, such as that devised by Kelly. This method requires a general anæsthetic, and does not give as complete a view as the indirect method, and is hardly ever used now.

2. *Indirect Cystoscopy.*—This is performed by means of a cystoscope which consists of a hollow metal tube 20 centimetres long, with an electric lamp fitted on the distal end. This tube acts as a catheter. The inner tube or telescope, which is passed through the outer tube, is fitted with an eyepiece which, by an arrangement of mirrors, gives a view of the object at the distal end of the instrument.

Method of Indirect Cystoscopy.—The patient is placed in the dorsal position, and the area of the vulva cleansed and isolated by sterilized towels. If necessary, the urethra can be anæsthetized by cocaine inserted into the urethra on cotton-wool. The cystoscope

is sterilized, and the outer tube lubricated with sterilized glycerine and introduced into the bladder. The urine is drawn off, and, if necessary, the bladder is washed out; and, when the returning fluid is clear, 8 to 10 ounces of boric acid solution are left in the bladder. The inner tube is now passed down the outer tube, the electric light switched on, and the beak of the cystoscope turned down towards the base of the bladder. The trigone is examined first, and the condition of the mucous membrane noted. The interureteric bar is next looked for, and by following it out on either side the openings of the ureters can be seen. These openings, if the kidneys are acting normally, can be seen to contract at intervals and eject small jets of urine, which are especially apparent if the urine contains pus. The rest of the bladder is now examined by rotating the beak of the cystoscope and depressing or elevating the proximal end as it becomes necessary.

Ureters and Kidneys.—After abdominal palpation and bimanual palpation with one hand in the loin and, if indicated, an X-ray examination, further examination of the kidneys and ureters can be made by the ureteral catheter, which is 30 inches in length and is graduated in inches. The catheter is passed along a special channel in the cystoscope, and when the ureteral opening is seen the catheter is pushed out until it comes well into the field, and then by manipulation it is brought as near the opening of the ureter as possible, and by elevating the carrying gutter the point of the catheter is guided into the ureteric opening and gently pushed along. When the catheter has passed along 2 to 3 inches, the gutter is lowered and the catheter passes more readily. It should be passed for a distance of 12 inches, until the pelvis of the kidney is reached. A second catheter is passed up to the other kidney, and the urine from each kidney is received into a sterilized bottle for detailed examination.

DISORDERS OF MICTURITION.

The urinary bladder and urethra in the female, owing to their situation, are especially liable to infections which may attack the genital organs. The urethra, the orifice of which is situated in the vestibule at the entrance of the vagina, is a short wide canal constantly exposed to the contamination of vaginal and other discharges. The urethral canal runs up to the bladder immediately behind the symphysis, and is subject to pressure by any growth or swelling which may occupy and fill the pelvis. Bacteria are always found in the anterior part of the urethra, and, should the

resistance of the patient be lowered, or an instrument be passed into the bladder, are a fruitful source of infection, especially if the bladder is not completely emptied at each act of micturition.

Frequency of Micturition.

Frequency of micturition is a very common complaint in the female. Although usually associated with changes in the urine, or lesions of the urethra or bladder, or disease of the pelvic organs, in some cases it is present simply as a symptom without any ascertainable cause. To make the investigation of this symptom as complete and systematic as possible, its causes may be classified as follows:

1. Changes in the urine.
2. Lesions of the urinary tract.
3. Lesions outside the urinary tract.

1. Changes in Urine.—Frequency of micturition may be caused by too great concentration of the urine leading to hyperacidity and the deposition of urates. Errors of diet and a faulty metabolism may cause the urine to contain an excess of oxalates or phosphates, with consequent irritation of the vesical mucous membrane and frequent desire to void the irritating fluid.

Organic disease of the kidneys or other organs leading to a greatly increased output of urine, which may or may not contain sugar or other abnormal constituents, causes the distended bladder to be emptied frequently. Nocturnal frequency of micturition is often associated with organic disease of the kidneys, with cases of increased blood-pressure, and, especially in children, with bacillus coli infection of the urine.

2. Lesions of the Urinary Tract—Acute Urethritis.—Although, as has been stated, bacteria are always present in the anterior part of the urethra, it is very uncommon for organisms other than gonococci to give rise to symptoms of irritation. This is probably due to the fact that those bacteria which ordinarily reside in the urethra are of low virulence, and do not tend to multiply and spread up along the urethra, while the gonococci, when implanted in the urethra, are in a state of great activity, and quickly spread back to the posterior urethra, and, even without extending to the bladder itself, may give rise to frequency of micturition.

Chronic urethritis does not give rise to frequency of micturition unless associated with an infection of the bladder.

A stricture of the female urethra following a gonorrhœal urethritis is almost unknown.

Cystitis.—Acute cystitis is due to a bacterial infection of the bladder wall, in which the organisms reside and multiply. The whole mucous surface of the bladder may be acutely inflamed, and in some cases the surface is ulcerated and covered with a thin film of pus, but in most cases it is found that the trigone of the bladder is the only part affected. The infection generally ascends *per urethram*, or is carried by a catheter or other instrument passed into the bladder without proper precautions, or when there is a purulent urethritis present. The organisms most usually present in the neighbourhood of the urethra are the bacillus coli communis, bacillus proteus, streptococci, staphylococci, and gonococci. These organisms either alone or in combination invade the mucous membrane and give rise to cystitis.

In other cases the infection may descend to the bladder from the kidneys and ureters. The infecting organism in this case is usually the bacillus tuberculosis or the bacillus coli communis; in the latter case there may be a stone in the pelvis of the kidney.

Urine.—In early cases of cystitis the urine is cloudy and contains a small trace of albumin. The reaction is acid except in those cases in which the urea is split up with the formation of ammonia. In the more severe type the urine is turbid with strands of mucus, and on standing there is a deposit of pus. A large amount of albumin is present in addition to red blood-corpuscles.

Symptoms.

A heavy dull pain is experienced in the hypogastrium, with great frequency of micturition, the passage of small quantities of urine, and pain following the act. The bladder is tender on palpation, especially on bimanual examination. There is some degree of fever present, and, if the infection is a virulent one, rigors may usher in the attack. Should the infection spread up the ureters to the kidneys, the constitutional disturbance is greater; vomiting, and tenderness in the course of the ureters, may be present. Should the right ureter be affected—and it is the one often attacked first—the fever, vomiting, and tenderness are very suggestive of acute appendicitis, and many patients have been operated upon in the belief that the attack was acute appendicitis. The extension of the tenderness to the kidney, in conjunction with the absence of signs of peritonitis, should exclude appendicitis. A bacteriological examination of the urine will prove the nature of the infection.

Treatment.

The patient must be kept in bed. The diet must be simple, with avoidance of alcohol.

The spasm of the bladder may be lessened by directing the patient to drink bland fluids, such as barley water, in large quantities (5 to 6 pints in the twenty-four hours), which make the urine less concentrated; and by the administration of hyoscyamus or belladonna. In addition antiseptics should be prescribed. Hexamine is a good urinary antiseptic, and should be given every six hours in 10-grain doses in 5 ounces of water; but it is inactive if the urine is alkaline, in which case formamol in similar doses should be ordered. If hexamine gives rise to gastric irritation, it should be combined with 2 to 3 grains of papaine. The fresh infusion of buchu is useful as a diuretic and disinfectant. In some cases the frequency of micturition is so great, and the tenderness so painful and persistent, that it is necessary to keep a self-retaining catheter in the bladder to drain it. When the acute stage has passed off, irrigation of the bladder may be undertaken with a 2 per cent. solution of boric acid; and if the attack does not promptly clear up, a 2 per cent. solution of some colloidal silver preparation may be injected, in 2-drachm doses. A weak solution of formalin, gradually increasing the strength up to 1 in 1,000, may also be used for washing out the bladder. In cases in which the acute stage persists, treatment with an autogenous vaccine is sometimes followed by amelioration of the symptoms.

Chronic Cystitis.—Chronic cystitis is usually a sequel of an acute cystitis. Owing to disease of the kidney caused either by the bacillus tuberculosis or the bacillus coli communis, sometimes in association with a stone, pus passes down the ureter and infects the bladder, though it is remarkable how long purulent urine from the kidneys may pass into the bladder without infecting it. Tuberculosis of the bladder never occurs as a primary lesion, but is always associated with tuberculosis of the kidney.

Growths and tumours in connection with the pelvic organs may, from their position, press upon the bladder and give rise to obstruction and overdistension, with subsequent infection. Thus, a fibroid of the uterus or an ovarian cyst may fill the pelvic cavity and press the urethra against the symphysis pubis, and lead to obstruction, as may also a retroverted gravid uterus. The bladder may be infected directly in cases in which inflamed Fallopian tubes or

advanced uterine cancer are adherent to the bladder, or in which the bowel is adherent to the bladder.

Foreign bodies introduced into the bladder may at the time of insertion infect the bladder, or by irritating the mucous membrane lower its resistance and pave the way to infection.

A papilloma of the bladder will, in addition to paroxysmal hæmaturia, give rise to irritability of the bladder with frequency of micturition.

Malignant ulceration of the bladder is often associated with cystitis, and causes hæmaturia and painful and frequent micturition.

A calculus may give rise to cystitis, and, even without inflammatory change in the bladder, will be associated with frequency of micturition.

Treatment.

The foregoing conditions must be relieved by surgical measures, and the cystitis treated by urinary antiseptics and bladder irrigation. If these measures do not meet with success, an autogenous vaccine should be tried.

Bacilluria.—Bacilluria is a condition in which bacilli are present in the urine without evidence of any actual urinary lesion. The bacilli live in the mucous membrane of the bladder, or in other cases in the pelvis of the kidney, and are discharged into the urine. This condition represents a special type of infection in which there is an excessive growth of organisms with usually a minimum of reaction.

Bacillaria is found in infants and children. Women are especially liable to the disease.

Pathology.

The bacillus coli communis is the commonest organism present, and is found in pure culture in quite 80 per cent. of the cases. Other organisms found include the bacillus typhosus, proteus vulgaris, staphylococcus, bacillus subtilis, or a streptococcus. These can generally be obtained in pure culture. Bacilluria may occur spontaneously, or more commonly may follow or accompany some constitutional illness, inflammatory disease, or pregnancy. The bacteria may gain access to the bladder from the kidney (hæmatogenous infection), or may be introduced by a catheter or other instrument. In other cases the bacteria, generally the bacillus coli communis, may find their way into the bladder *per urethram*. This happens especially in pregnant women. The urine is cloudy, and when stirred has a peculiar streaky or cloudy appearance, due to the

suspension of the myriads of bacilli. The reaction is usually acid, very rarely alkaline. There is, as a rule, an absence of pus cells or deposit, but albumin is often present. Microscopically the field is crowded with organisms, usually the motile bacillus coli communis.

Symptoms.

These are generally latent, although the urine may be teeming with bacteria; but at considerable intervals there may be increased frequency of micturition, with some burning on passing water.

In other cases, occurring chiefly in pregnant women, there may be recurrent attacks of high fever with rigors, with tenderness in the course of the ureter extending up to the kidney. Exceptionally this may lead to a grave condition of the patient, accompanied by wasting and cachexia, which, however, are generally relieved by the termination of pregnancy.

Pyelitis associated with pregnancy very rarely requires the induction of labour or abortion.

Treatment.

The first essential in treatment is to keep the patient in bed and give large quantities of fluid to dilute the urine. As the bacillus coli does not flourish in an alkaline medium the urine should be made alkaline by large doses of potassium citrate. When the urine has been markedly alkaline for a few days, and the resistance of the organism has been enfeebled, the time has arrived for urinary antiseptics, the best of which is hexamine. As this drug and others of a like character set free formalin only in an acid medium they should be prescribed with acid sodium phosphate or benzoic acid. A very useful mixture is one containing 10 grains each of boric acid, ammonium benzoate and hexamine.

Vaccines, which should always be autogenous, may also be used. In chronic cases the treatment is often disappointing; although the symptoms may be relieved and the pus eliminated from the urine, some bacilli will generally remain in the bladder or kidney waiting an opportunity to multiply and cause symptoms again.

3. **Lesions outside the Urinary Tract.**—Frequency of micturition is a very common complaint, and exists quite apart from lesions of the urinary tract. It is often met with in girls and young women, and may have been present since birth, and is in all probability due to defective sphincter control. Just before normal menstruation, apart from any pelvic or other disease, the bladder may become

irritable through the pelvic congestion, and call for frequent emptying.

Frequency of micturition is associated with cystocele and the minor degrees of prolapse of the uterus, which are the commonest causes of this complaint. It is then diurnal only, and is thus distinguished from the inflammatory type, in which there is nocturnal frequency as well.

The increased weight of the uterus during the early months of pregnancy, before it has risen out of the pelvis, leads to frequency of micturition, which, however, passes off after about the fourth month, but recurs again during the last four to six weeks, when the presenting part enters the pelvis and again presses on the bladder. Some patients suffer from this condition during the whole of pregnancy. Enlargement of the uterus due to tumour formation may, by increased weight, lead to the same complaint.

Frequency of micturition associated with cystocele or prolapse is treated by the use of a pessary or by operative measures.

The administration of thyroid extract or ovarian extract, which helps to correct what may be termed the "deficient ovarian activity" causing a scantiness or irregularity of the menstrual flow, may also aid in overcoming the frequent micturition associated with establishment of the menses.

Incontinence of Urine.

Incontinence of urine means that the bladder is unable to retain urine normally, so that the urine escapes involuntarily. If, however, a patient complains that she cannot hold her water, she may mean that she has to pass water frequently, that she has urgency of micturition—*i.e.*, that the desire to micturate must be acceded to at once, or some or all of the urine in the bladder will be passed involuntarily, that on coughing or sneezing a few drops or more escape, or, lastly, that she really suffers from incontinence. It is obvious, therefore, that a complaint that a patient cannot hold water calls for careful investigation. The question "Do your clothes get wet?" is a useful one.

Minor degrees of Incontinence.

Urgency of Micturition.—In this condition the patient cannot long resist the desire to micturate. If she does not have to wait there is no incontinence, but if circumstances prevent her from passing water at once the sphincter is not strong enough to withstand the strain, and some or all of the contents of the bladder are passed involuntarily. The patient may say that she has been liable

to this "weakness" all her life and, possibly, that it has been more troublesome since childbirth. In such cases examination of the urine and of the urethra, bladder, and surrounding organs may reveal nothing abnormal. In others there may be found hyperacidity of the urine, or a cystocele, or some tumour, such as the pregnant uterus or a pelvic or abdominal tumour, may be pressing on the bladder. Urgency of micturition may be an early symptom of disseminated sclerosis, a disease which should be thought of if a young woman who is otherwise of convivial habits invariably refuses invitations to tea-parties. The treatment may be considered with that of the next variety of incontinence, a very common one, in which the patient says that although the bladder is never emptied involuntarily, yet a small quantity of urine is passed on any exertion, especially on laughing, coughing, or sneezing. This trouble may be present from early life, but usually dates from a confinement, when it is probably due to some damage to the sphincter of the bladder. As a rule there are no abnormal physical signs, unless there is some prolapse of the anterior vaginal wall.

The treatment of these cases is often unsatisfactory. Any gross abnormality should be corrected or removed. Alkalis, to diminish the acidity of the urine, bladder sedatives, a ring pessary or anterior colporrhaphy if there is a cystocele, and general tonic treatment are sometimes successful, but in some cases an operation to tighten the sphincter of the bladder and the upper part of the urethra, or electrical treatment to the neck of the bladder will be called for. In cases which are classed as nervous in origin, apart from the presence of spinal cord lesions, the wearing of a rubber urinal for a time may have a good effect by giving the patient a feeling of safety, and when she has acquired confidence she may leave off the urinal except in specially trying circumstances such as a railway journey. A few patients find it necessary to wear a rubber urinal constantly when out of doors.

Major degrees of Incontinence.

Real incontinence of urine may be divided into two varieties —false and true. **False** incontinence means overflow from a full bladder, and is the result of retention (see p. 519).

Causes.

True Incontinence.—True incontinence may be developmental, nervous or traumatic in origin.

Developmental.—In early fœtal life the rectum and bladder open into a common opening called the cloaca. With further development the recto-vaginal and vesico-vaginal septa are formed. If

the development of the septa is arrested, the condition known as "persistent cloaca" may be present, the patient having no control over the passage of urine and faeces. In other cases the rectum is shut off, but the vesico-vaginal septum fails to close the urogenital sinus, and the base of the bladder and the urethra open directly into the vagina. Incontinence is necessarily present.

Ectopia vesicæ, a condition in which the bladder opens in the neighbourhood of the symphysis pubis, is also congenital. This, as well as the foregoing deformities, is frequently associated with maldevelopment of other structures, and the subject is often puny and delicate and dies early.

Traumatic.—Injury to the uterus or vagina during parturition may cause sloughing either of the lower part of the uterus itself, or of the vagina, with the formation of a vesico-uterine or more commonly a vesico-vaginal fistula. This complication usually occurs as the result of obstructed labour when the vertex is presenting, the membranes have ruptured, and the head is pressing the lower part of the uterus or the vaginal wall against the symphysis, with the bladder intervening. The prolonged pressure leads to strangulation of the blood-supply, with consequent tissue-necrosis and the formation of a fistula. A badly fitting or long-forgotten pessary may also lead to the formation of a vesico-vaginal fistula. Operations such as the removal of large uterine tumours, hysterotomy, or hysterectomy, may damage the bladder and cause a fistula. Forceps delivery and destructive obstetric operations may also cause a fistula.

The ureters may be damaged by abdomino-pelvic or vaginal operations, and cause a uretero-vaginal fistula to develop. Malignant growths of the uterus or vagina may ulcerate into the bladder and cause a fistula, or, on the other hand, a malignant growth of the bladder may ulcerate into the vagina.

The diagnosis of a fistula must be made by means of a speculum. A careful examination is made of the vagina, and an obvious hole or a depression through which a probe can be passed into the bladder may be seen. If the fistula cannot be located, the bladder should be emptied and sterilized milk injected into it, when minute drops may be seen oozing into the vagina when pressure is made on the bladder. The cystoscope may be of use in diagnosing a fistula if the bladder is sufficiently continent to hold enough fluid for its employment. If the fistula is an ureteric one, its site is made more obvious by the patient taking a dose of methylene blue which colours the urine green, but a cystoscopic examination is necessary to decide the matter.

Traumatic.—See vesico-vaginal fistula (p. 297) and utero-vaginal fistula (p. 298), and cystoscopic examination.

Nervous Disease with Incontinence.—In certain nervous diseases in which the bladder is cut off from the higher centres, the bladder may act automatically. This occurs in lesions above the lumbar centre. In locomotor ataxy there are vesical crises and sudden involuntary evacuation of the bladder.

Treatment.

For incontinence due to some developmental cause, if the infant is healthy and thriving, some plastic operation must be performed, as the discomfort of the incontinence is quite insupportable. The operative treatment of traumatic fistulæ is considered on p. 298.

False Incontinence.—Incontinence of urine may be caused by overdistension of the bladder. When the distension of the bladder has reached a certain stage, the urine dribbles away in frequent gushes. This condition, which is termed the "incontinence of retention" or the "overflow of retention," may be due to tumours growing from the pelvic organs and becoming impacted in the pelvis. The tumour in its growth pushes the uterus upwards, and sometimes so high above the symphysis pubis that the examining finger cannot feel the cervix. The effect of this displacement is to elongate and flatten the urethra and make the bladder an abdominal organ. Retroversion of the pregnant uterus may act in the same way.

Nocturnal Enuresis.—By this is meant the involuntary passage of urine during sleep. This complaint in the majority of cases originates in infancy and early childhood. It may be associated in children with thread-worms or some form of vulvitis. In other cases the urine is very acid and loaded with [illegible]. In a large proportion of cases no abnormality can be found; some of these may be due to epilepsy. There is frequently a history of some nervous disease in blood-relations, and the subject of the incontinence may exhibit some minor form of inco-ordination. With this form of incontinence there may be some diurnal weakness of sphincter control on violent exercise or on coughing or sneezing.

Treatment.

The treatment of nocturnal enuresis in the absence of any abnormality is disappointing. Electric treatment applied to the bladder and sacrum has not been attended with good results. Belladonna appears to be the most successful drug employed. It is administered

at first in five-minim doses three times a day, and then increased up to half a drachm until the patient suffers from dryness of the throat and dilatation of the pupil: after some three to four weeks' treatment the dose is slowly reduced. During the administration of these large doses of belladonna the patient must be kept under constant supervision, as symptoms of delirium may suddenly appear. At the same time she must be instructed not to drink anything for some hours before bedtime, and, if necessary, at the commencement of the treatment she must be roused in the early part of the night to pass her water. She should not sleep on her back.

Treatment by thyroid extract in cases associated with maldevelopment and scanty menstruation is sometimes attended with good results. The drug should be administered in one-grain doses at first, and, if no bad symptoms, such as tachycardia or dizziness, occur, the dose should be slowly increased until the patient is taking 5 grains three times a day.

Retention of Urine.

Retention of urine means that the urine flows into the bladder but cannot pass out. It must be distinguished from suppression of urine, or anuria, in which no urine passes into the bladder.

Causes.

Retention of urine may be due to (1) nervous or (2) mechanical causes.

1. *Nervous causes* of retention are numerous, such as the retention that is common in the first few days of the puerperium and after operations on the pelvic organs. In these cases there is often a combination of causes—the patient is lying on her back, the abdominal wall or some part of the genital or urinary organs is tender and the patient is prevented from straining by the pain which this involves. Extensive operations on the pelvic organs, such as removal of the uterus by a radical hysterectomy, which involve a dissection and exposure of the base of the bladder, cause, possibly by damage to the nerve-supply, great loss of tone in the wall of the bladder, as well as alteration in its mechanical supports.

Retention of urine may be caused by lesions of the cerebro-spinal system.

Hysterical retention of urine is met with in girls about puberty and in young women of a neurotic tendency.

2. *Mechanical Causes.*—The urine may, rarely, be prevented from leaving the bladder by obstruction in the urethra or neck of

the bladder. A stone may become impacted in the urethra or neck of the bladder, but this is a rare occurrence, as is also a stricture of the urethra. Carcinoma of the urethra or of the neck of the bladder causing a block is very rare, but carcinoma of the cervix, at a comparatively late stage of the disease, may more frequently spread on to the vaginal wall and occlude the urethra by invading it or surrounding it.

A much more common mechanical cause is a swelling in the pelvis. Any swelling in the pelvis the size of a fœtal head or of a uterus three months pregnant may cause intermittent or permanent

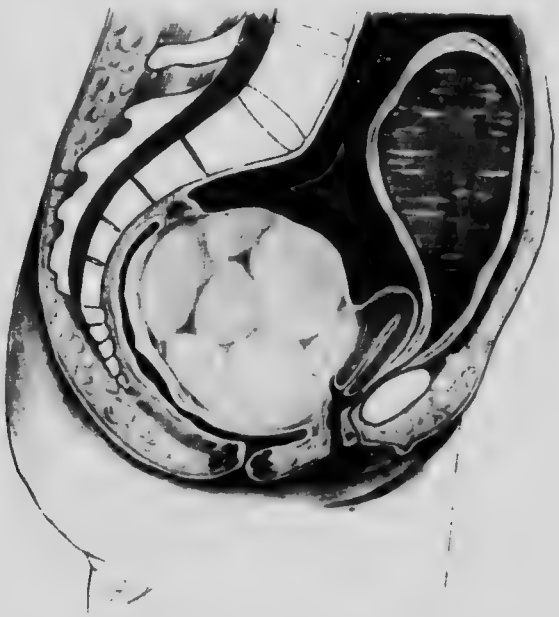


Fig. 203.—Fibroid impacted in Pelvis, causing Retention of Urine. Note elongation of urethra.

retention of urine. Such a swelling may be the fœtal head in the second stage of labour, the pregnant uterus remaining in the pelvis because it is retroverted or prolapsed, a uterine fibroid or uterus enlarged by fibroids, which remains in the pelvis instead of rising up above the brim, an ovarian or parovarian cyst which has become retained in the pelvic cavity, a large hæmatocele, a pelvic abscess, a hæmatocolpos, a pelvic hydatid, or an unusually large fibroid polypus. A Champetier de Ribes's bag or a vaginal plug will act in the same way. Of these numerous causes, the only common

ones are a retroverted pregnant uterus and uterine fibroids. With the latter retention commonly occurs only just before a menstrual period. Pelvic swellings which cause retention of urine may do so in one of two ways—they may compress the urethra against the symphysis pubis or they may lift the cervix or the whole uterus upwards and forwards with the result that the urethra is stretched to such an extent that the mechanism of micturition is thrown out of gear (Fig. 203).

Retention of urine must always be considered an important symptom. If the cause is not removed at once there must be a likelihood of cystitis occurring, which may be a very serious matter if the kidneys have suffered from back-pressure, in which case ascending pyelonephritis may result.

Treatment.

Retention of urine must be distinguished from anuria or the suppression of urine. Retention due to incarceration of the gravid uterus is relieved by correcting the displacement, and that due to impaction of pelvic tumours by their removal.

The retention due to prolapse of the uterus when the patient is pregnant is relieved by pushing up the uterus out of the pelvis; after pregnancy has advanced to the stage that the uterus is supported by the pelvis the pessary can be removed. After delivery the prolapse can be cured by some operative treatment.

Retention after labour or operations is treated by sponging the vulva with warm antiseptic lotion, by supra-pubic pressure, or by allowing the patient to sit up with support from the nurse. If these remedies fail it may be necessary to pass a catheter, and in some cases the catheter has to be used for several days.

Hysterical retention is generally overcome by firmness and withholding relief by the catheter, and the administration of sedatives such as bromides; a hot bath, a strong purgative or enema will often relieve retention.

Painful Micturition.

This is a very frequent complaint either alone or with other symptoms.

Causes.

Painful micturition is usually associated with abnormal constituents, such as uric acid, or too great concentration of the urine, or with disorders of the bladder and urethra. In other cases the condition is due to some inflammatory disease of the pelvic organs causing pelvic peritonitis, the change of size of the bladder

when distended or when it relaxes during micturition causing pain owing to the inflamed peritoneum being pulled upon. The disorders of the bladder which cause painful micturition are cystitis, dependent upon infection or associated with malignant, tuberculous, or other ulceration, or with stone or other foreign body in the bladder. The urethra may be involved with the other genital organs in a gonococcal infection, or may be the site of a caruncle (see p. 284).

Painful micturition may also be associated with ulcerating growths of the vulva, which may be carcinomatous, of syphilitic, or other infective origin. Again, tears following childbirth, or eczema or dermatitis of the vulva, may give rise to this symptom.

Treatment.

The treatment consists in treating the underlying cause, and relieving the pain by administering sedative drugs, such as belladonna and hyoscyamus, by diluting the urine with bland fluids, and reducing the acidity with alkalies. In other cases, when the patient takes very little fluid, relief may be obtained by drinking a larger quantity of bland liquids.

SECTION X.—INTESTINAL DISORDERS

CHAPTER LXIII

THE ACUTE ABDOMEN

UNDER this heading are included cases of severe and diffuse abdominal pain of sudden onset and rapidly increasing constitutional disturbance, occasionally reaching collapse. The pain may be local at first, but is soon general over the whole abdomen, and is accompanied by tenderness, rigidity, loss of respiratory movement, and varying degrees of distension. Vomiting is persistent, and sometimes faintness occurs. The pulse is frequent and increases in rate, and the patient rapidly becomes extremely ill, with hollow eyes and sunken cheeks, and, unless a timely operation is performed, death follows in the majority of cases in a day or two. These acute abdominal symptoms may occur as the result of such conditions of the genital tract as the onset of general peritonitis from the escape of pus from a Fallopian tube or ovarian abscess, from the rupture of an ectopic gestation, or from the twisting of the pedicle of an ovarian cyst, but are more often due to perforation of a gastric or intestinal ulcer, or the sloughing or perforation of the appendix or gall-bladder, or strangulation of intestine. Attacks of renal or biliary colic may be accompanied by serious collapse and vomiting, and give for a time similar symptoms.

In some cases an exact diagnosis may be impossible, for examination is difficult and the general signs of acute and severe abdominal disturbance may mask all localizing signs. The history of the patient, both as regards past illnesses and as regards the onset of the present, is important. The occurrence of amenorrhœa may suggest a ruptured ectopic gestation, and the previous passage of gall-stones or the vomiting of blood may indicate an origin from the gall-bladder or stomach. The position where the pain was first noticed is often helpful, but is not always indicative of the region of the abdomen affected. The appearance of the patient may

suggest internal hæmorrhage; the blanching of a woman with intra-peritoneal flooding from a ruptured extra-uterine pregnancy is very characteristic, and the other signs of internal hæmorrhage would then be looked for. In pelvic cases generally, the greater rigidity and tenderness of the lower abdomen, the loss of respiratory movement below the umbilicus, and the tenderness and sometimes the feeling of a pelvic swelling on bimanual examination, will point to an origin from the genital tract. It is, however, unnecessary to give a detailed discussion of the differential diagnosis of these cases. This paragraph is rather designed to remind the student that the whole abdomen must be investigated if errors are to be reduced towards vanishing-point.

APPENDICITIS.

The anatomical position of the vermiform appendix is such that not only is inflammatory disease of this organ often mistaken for a similar condition of the right Fallopian tube, but disease of this nature in the Fallopian tube is occasionally due to infection from the appendix, with the result that these organs become adherent to each other. The appendix is attached to the inner and posterior surface of the cæcum, and may be found lying in any direction. There are, however, three positions which it more commonly assumes. It may either point inwards towards the spleen, or lie behind the cæcum, or point downwards into the pelvis. This last position is the commonest, and it is here more particularly that difficulties are apt to arise, since an appendix so situated is in close relation with the right Fallopian tube and ovary, and if long enough may dip into the pelvis and lie in apposition with them, and, further, when the cæcum is prolapsed as the result of enteroptosis, the appendix may lie entirely in the pelvis and in front of the rectum.

An account of appendicitis should therefore be found in a text-book dealing with diseases peculiar to women; for the vermiform appendix in a woman can no longer be regarded as an object divorced from her genital organs. The removal of the appendix has frequently to be undertaken by the gynæcological surgeon. In many cases he has to remove it whether he wishes or not, owing to its adhesion to the right uterine appendages. In others the abdomen is opened on the assumption that the condition is one of acute salpingitis, whereas it proves to be an acute appendicitis.

Cause.

The cause of appendicitis is not known—at any rate in most cases. The fact that the appendix has a very poor blood-supply, that it contains a large amount of lymphoid tissue, and that its opening into the cæcum is very small, may be contributory factors. Certain it is that in many cases the disease is preceded by constipation of long standing. It would be impossible to deny that appendicitis may sometimes be due to an infection via the Fallopian tube, since it is certain that on occasions the tube is infected by the appendix. The infecting micro-organisms are generally streptococci or colon bacilli, but to enable these to gain a footing the mucous membrane must be injured in some way.

There are three principal conditions leading up to an attack of appendicitis:

1. *Catarrhal Inflammation of the Appendix.*—This probably spreads from a similar condition of the cæcum. So long as the catarrhal products drain from the appendix into the cæcum no symptoms result; but if the communication with the cæcum becomes obstructed, either by swelling of the mucosa, or presence of a stercolith, or twisting or kinking of the appendix, then the inflammatory products accumulate in the appendix (pyo-appendix). The swelling of the appendix may then lead to acute torsion or acute kinking, especially if it has a short mesentery at some point, which is often the case. Gangrene and rapid increase of the symptoms then ensue.

2. *Ulceration due to a Stercolith or Foreign Body.*—As a result of the ulceration a general catarrh may supervene, and lead up to the same condition as described above; or rarely the ulcer may directly perforate, with the typical acute symptoms of a perforated viscus.

3. *Acute Torsion of the Appendix.*—This is a rare cause. It is comparable with volvulus elsewhere.

Appendicitis may be acute or chronic.

ACUTE APPENDICITIS.

Although the attack may come on insidiously, it arises as a rule quite suddenly and in a person who is apparently in good health.

Symptoms.

Pain.—This, the initial symptom, varies in severity, but may be very intense and in some cases agonizing. It is frequently at first a generalized colic, and is felt in the region of the attachment of the

mesentery—*i.e.*, in the umbilical region. In other cases the pain is first noticed in the right or left iliac regions. After an interval this intense paroxysmal pain is succeeded by a constant ache, localized in the right iliac region. According to the position of the appendix, the pain will radiate towards the umbilicus, into the right loin, or into the pelvis. In some cases, and these the most serious, being usually those associated with perforation, gangrene, or bursting of an abscess, the paroxysmal pain suddenly ceases; but such amelioration of pain is not in every case of such dire significance, for occasionally the intense pain at the onset of the disease alternates with fairly long periods of freedom from pain.

The attack does not always begin suddenly, in which case the patient for a day or two will complain of feeling unwell and of a troublesome pain or ache in the region of the appendix.

If general peritonitis develops, the pain spreads all over the abdomen.

Intestinal Disturbances.—The patient will complain of nausea, and in most cases will have one or more attacks of vomiting at the beginning of the disease. The vomiting soon stops, but if general peritonitis develops it will return. At first there will be flatulence, and the distension caused thereby may be irksome, and the patient finds it impossible to pass flatus. The general distension tends to subside except in cases of general peritonitis.

A history of constipation will be obtainable in nearly every case, both before and during the attack.

General Condition.—Most patients complain of a general malaise, though a few insist that, apart from the pain, they feel quite well. If the inflamed appendix is in the pelvis, and especially if there is an abscess, the patient may have diarrhœa and painful and frequent micturition.

Signs.

Tenderness.—Local cutaneous hyperæsthesia is present with the lightest touch on the right side, but not the left. Tenderness is a most important sign, and persists even if the pain subsides. In the very early stages it is apt to be general, but it soon becomes localized, and then as a rule it corresponds with the position of the appendix. Thus, the tenderness may be towards the umbilicus, in the loin, over the pelvis, or it may be elicited only on deep palpation or by a vaginal or rectal examination.

Rigidity.—There is little or no rigidity of the abdominal muscles in the early stages of the disease, but as the pain becomes localized rigidity appears in the affected area, and is thus a sign of great

importance. A marked general rigidity suggests general peritonitis, but absence of all rigidity is at times associated with gangrene and perforation.

Impaired Movement.—The abdomen does not move freely on respiration, and if general peritonitis is present the breathing is entirely thoracic.

Temperature.—As a rule the temperature rises with the onset of the disease, rarely with a rigor. It is seldom higher than 103° F., and the rise may be either sudden or gradual, most frequently the former. After two or three days the temperature, in a favourable case, falls gradually. A sudden fall is of serious import, being often associated with perforation and gangrene. In some cases of general peritonitis, the temperature after the initial rise may remain normal or subnormal. A persistent high temperature signifies that the attack is a very severe one or that complications are present.

Pulse-Rate.—The pulse-rate is a much more important indication than the temperature. In most cases the rate is increased from the beginning of the disease, and is markedly out of proportion to the temperature. Occasionally severe attacks occur with but little alteration of the pulse-rate.

Tumour.—As a rule, except in very slight cases or in patients suffering from general peritonitis, or when the appendix is gangrenous, an indefinite localized tumour can be felt after a time in the region of the diseased structure. This tumour is composed of a mass of matted intestine and omentum, and if it becomes circumscribed an abscess may be diagnosed with certainty. The localized rigidity of the abdominal muscles must not be mistaken for the tumour. In the case of an inflamed pelvic appendix, a tender mass may usually be felt by a vaginal or rectal examination.

Some general distension of the abdomen is usually present owing to flatulent distension of the gut.

Results.—The attack may subside, an abscess may form, the appendix may perforate or become gangrenous, or the condition may become chronic.

Resolution.—The patient rapidly improves, the temperature falls, the pulse-rate becomes normal, the pain disappears, and within a few days the tenderness has gone. Such a termination is not uncommon, but must never be relied on.

Abscess Formation.—In this case a rigor is common, the symptoms are more acute, and the rigidity more marked. Fever will continue, or a commoner and more important indication is that the temperature, having fallen somewhat for a day or two, rises

again to a higher level at night, with morning remissions and sweating. The pulse-rate increases, the tongue becomes dry, the local pain becomes more marked, and a definite tumour, which is intensely tender, can be felt. A blood-count will show a leucocytosis of 20,000 or over, with increase in the polymorphonuclear cells. If left to itself, the pus may track in various directions, upwards to the under-surface of the liver or diaphragm, downwards into the pelvis, or outwards into the loin. The abscess may point through the abdominal wall or open into the bowel, more rarely into the bladder or peritoneal cavity. Nowadays such an event is extremely rare, owing to the probability that the patient will be operated upon before it could happen.

Perforation.—If the appendix perforates, the condition of the patient undergoes a sudden change, and she becomes rapidly worse, owing to the onset of general peritonitis. The pulse-rate will become very fast: the pain may cease, but later will become general and intensified. The area of localized tenderness will spread till it becomes general, the abdomen will become distended and tympanitic, hiccough and incessant vomiting will follow, and the temperature may rise, but will often become subnormal. Constipation is complete, and the passage of flatus impossible.

Gangrene.—Gangrene of the appendix is liable to remain, for some little time at any rate, unrecognized, if the patient is not examined thoroughly and with great care.

The reason for this is that with the onset of gangrene the pain disappears, the temperature falls to normal, and for a time the patient may say she feels much better. A careful observer, however, will not be misled by this apparent improvement in the patient, but will notice that the pulse-rate, instead of falling, has, if anything, risen, and that the localized tenderness is more marked. Moreover, this apparent improvement is only maintained for a short time; vomiting soon begins, the abdomen becomes progressively more distended, the patient looks pinched and haggard, the tongue dry, and her severe toxæmic condition will become manifest to the least observant.

Complications.

Rarely complications other than those already mentioned may supervene, such as general peritonitis, intestinal obstruction, septicæmia, cystitis, salpingitis, subphrenic abscess, empyema, pleurisy and pneumonia.

General Peritonitis.—The infection is seldom so severe that the general peritoneum is involved from the start. This complication

usually follows perforation or gangrene, and more rarely the extravasation of pus from an abscess. Its onset is indicated by effortless vomiting, which becomes incessant, of brownish fluid, a general distension of the abdomen, hiccough, obstinate constipation, a rise of temperature and pulse-rate, great pain, and general tenderness. It is by no means uncommon, however, when the infection is very virulent, for the temperature to be subnormal and the pain to be absent, but the pulse-rate remains rapid.

The student must remember that the classical symptoms and signs of peritonitis as described in textbooks refer to those cases in which the patient is almost moribund. One of the most difficult conditions to diagnose is a commencing peritonitis.

Intestinal Obstruction.—This complication may be due simply to paresis of the intestinal walls caused by the absorption of toxins, resulting in great distension with complete constipation and faecal vomiting, or secondary intestinal obstruction may result from adhesions.

Septicæmia.—The illness may continue for several weeks, resulting in a general septicæmia complicated by a subphrenic abscess, or a pylephlebitis with abscess in the liver.

Cystitis.—In cases of pelvic appendicitis with abscess formation infection of the bladder is not uncommon. The onset of dysuria is occasionally an early indication that a previously localized peritonitis is spreading.

Salpingitis.—The liability of the right Fallopian tube to become infected has already been dealt with.

Subphrenic Abscess, Empyema, Pleurisy, and Pneumonia.—These complications may occur when the disease is left a long time without operation, or may follow operation.

Diagnosis.

On occasions an attack of acute appendicitis may simulate one of acute salpingitis, the rupture or abortion of a tubal gestation, the rupture of an ovarian gestation, torsion of the pedicle of an ovarian tumour, perforated gastric or duodenal ulcer, inflammation of the gall-bladder, acute pyelitis, or renal or ureteric colic.

It is fortunate that all these conditions except the last three are properly treated by an abdominal section, so that, as far as the chances of the patient are concerned quâ operation, a mistake in the diagnosis by one who is prepared to treat an acute appendicitis by the only proper method—namely, an abdominal section—is not of serious import. The danger of confusing an acute pyelitis with

an appendicitis will be lessened if, in all doubtful cases, the urine is examined for pus and the colon bacillus. The patient's condition is usually less profoundly toxic in pyelitis than in appendicitis.

Acute Salpingitis.—The most common error in diagnosis is to mistake an acute salpingitis or a pyosalpinx for appendicitis, or *vice versâ*. The reasons for this have already been given, and do not require further elaboration. In many cases the history will be of great assistance, since acute salpingitis is due in nearly all cases to a streptococcal infection resulting from a septic miscarriage or labour, or to an attack of gonorrhœa. A word of caution, however, is necessary with regard to gonococcal infection, since a large number of women thus infected do not appear to be aware of the fact, the vulva and vagina escaping, or at any rate not being seriously involved. The fact that bilateral and tender swellings are found in the pelvis on bimanual examination, and that the uterus is fixed or partly so, make a correct diagnosis of salpingitis practically a matter of certainty. The more difficult cases are those in which the right tube only is affected, and may be mistaken for a swollen and inflamed appendix situated in the pelvis. A correct diagnosis may be impossible, but in the latter case the uterus is generally movable.

Tubal Gestation.—The pain may be so intense, the shock so marked, and the pulse-rate so rapid, in a case of ruptured tubal gestation or abortion, that it has often been mistaken for an attack of acute appendicitis. If the case is carefully investigated, however, in a routine way, the chances of a wrong diagnosis are not nearly so likely. In the first place, the history is most suggestive. Most of the patients have missed a period, and nearly all have a slight discharge of blood from the uterus. In addition, according to the stage of pregnancy reached when the rupture or abortion occurs, the breasts may be tender, the uterus will be enlarged, and its cervix may be soft. On vaginal examination the uterus will be movable, but great pain will result on its being moved, and there will be marked tenderness in the right or left quadrant of the pelvis, according to which tube is involved, and an indefinite swelling may be detected. It is obvious that the chances of confusion will be more likely if the diseased tube is the right one. It is, however, to the general condition of the patient that the attendant must turn for the greatest assistance in making his diagnosis, when it will be seen that this all points to the fact that the patient is *bleeding internally*, the signs and symptoms of which have been noted on p. 489.

MICROCOPY RESOLUTION TEST CHART

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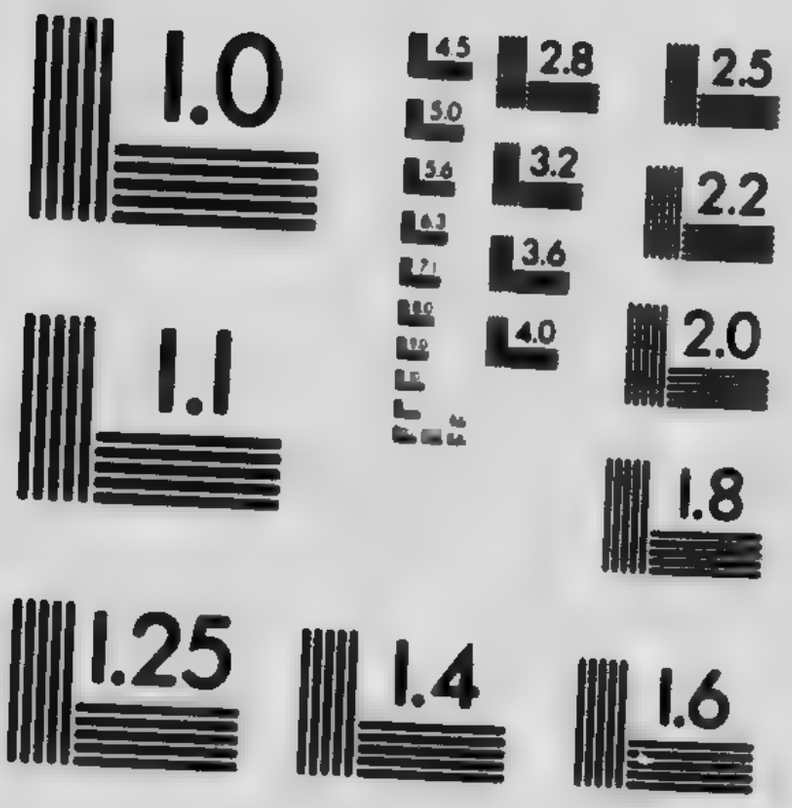

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Ovarian Gestation.—Ovarian gestation is extremely rare. With such a condition present, its rupture will call forth the signs and symptoms already noted under tubal gestation.

Acute Torsion of the Pedicle of an Ovarian Cyst.—When the pedicle of an ovarian tumour undergoes axial rotation, the veins in the pedicle become occluded. The resulting congestion stretches the wall of the tumour to such a degree that intense agony may result, accompanied by shock and vomiting. It may be known that the patient has an ovarian tumour, or a bimanual examination may establish the fact; but, as a small ovarian tumour is more liable to this complication than a large one, its presence may be unknown. There is no initial rise in temperature, the pulse-rate is not so suggestive, neither is there localized tenderness or rigidity —at any rate to the same degree as in acute appendicitis. The tenderness, rigidity, and rise of temperature only supervene when, as frequently happens, the ovarian tumour becomes inflamed.

Acute Pyelitis.—The number of times acute pyelitis on the right side is diagnosed as appendicitis is remarkable. The onset is sudden, the pain is intense, and there is a marked rise of temperature and pulse-rate. As a rule there is no distension of the abdomen, though it is true that one form of the disease mimics general peritonitis very closely; and there is no localized pain or rigidity over the usual site of the appendix, although there may be tenderness if the ureter is squeezed. The pain and rigidity are usually referred to the loin, where there is marked tenderness on palpation over the right kidney. The temperature keeps at a high level, and is apt to be very irregular. All doubts, however, can be set at rest by a careful examination of the urine. Acute pyelitis is most likely to be mistaken for inflammation of a retrocæcal appendix. A characteristic feature in acute pyelitis is the rapid improvement that may take place in the general condition between the rigors.

Gastric and Duodenal Ulcer.—The intense epigastric pain and shock and the rigidity associated with a perforated gastric or duodenal ulcer may give rise to an erroneous diagnosis of acute appendicitis. The history, however, will generally suffice to make such a mistake unlikely. The patient will probably have suffered for some long time with "dyspepsia," the pain being markedly increased on taking food in the case of a gastric ulcer, or coming on two or three hours after food is taken, and itself being relieved by food, in the case of a duodenal ulcer. Moreover, blood may have been vomited in the one case or passed in the motions in the other. If the per-

foration leads to an escape of gas to any extent, the liver dulness will be obliterated, and gas will escape when the abdomen is opened. As regards the local signs, the epigastric pain is persistent, and the rigidity in this position very marked, whilst the shock is much greater and the respiration-rate will be increased. General peritonitis will quickly follow perforation unless operated upon.

Inflammation of the Gall-Bladder.—In this case the tenderness in the right hypochondrium and loin is very marked, and the case may be mistaken for one of an acute abscess associated with a retro-cæcal appendix. Jaundice is generally present.

Prognosis.

If the patient is seen early, the prognosis is usually good. A persistent high temperature, or a sudden fall of temperature, with increased pulse-rate, recurrent vomiting, hiccough, and general distension, are signs of serious import.

Treatment.

It is an axiom of modern surgery that a case of acute appendicitis should be operated upon immediately. To decide otherwise is to court disaster, since it is impossible to tell with certainty, by any physical examination, whether the appendix is gangrenous, is likely to perforate, has perforated, or whether the general peritoneum has become infected. No medical attendant, therefore, is ever justified in assuming the responsibility of treating an attack with drugs, unless, as must very occasionally happen, the general condition of the patient is so serious that an operation would, of necessity and apart from the disease, put her in the greatest danger. The fact that an operation is contra-indicated because of the general anæsthesia necessary may be discounted, since it is quite easy and safe to operate under spinal or local anæsthesia. The mortality in cases treated by early operation is under 1 per cent., and of cases treated medicinally 15 per cent.

Granted, then, that the patient must be subjected to operation, when is the best time to perform it? This is a very important question, and one which in the past has been much discussed. On the one hand it is contended that the patient should be operated upon as soon as possible after the diagnosis has been made, and on the other that, if the case is not seen for forty-eight hours and the patient is improving, she should be left until resolution has taken place, and the appendix removed a week or two later; or, alternatively, if she is not apparently worse, she should be left until ad-

hesions have more securely isolated any pus that may be in process of formation.

The balance of opinion is in favour of early operation for the following reasons: It is impossible to be certain whether a case will resolve or not, or whether the appendix will perforate or become gangrenous. Moreover, the improvement in a patient is often entirely fictitious, and really a most dangerous sign, being in many cases the sign of gangrene or perforation; whilst to wait for the further isolation of pus only results in a larger collection and a longer period of convalescence for the healing of the larger cavity.

Having, then, decided in favour of immediate operation, should the surgeon endeavour to remove the diseased appendix in all cases? The answer to this question is, Yes, if it can be done without increasing the danger to the patient. This will be possible when the appendix is practically free of adhesions, as is the case in perforation, gangrene, and in the early stages of an acute attack. If, however, an abscess has formed and the appendix is bound down by dense adhesions, perhaps in some almost inaccessible position behind the cæcum, then many think that the patient will be given the best chance if the abscess is simply opened and drained, the appendix being removed at a later date. It is contended that to hunt about for an appendix amidst adherent coils of intestine only results in breaking down these adhesions, and therefore subjects the patient to the great and increased risk of an extension of the disease. Undoubtedly, many cases of general peritonitis have resulted from an excess of zeal on the part of the operator.

On the other hand, many authorities contend that if the operation is performed by one conversant with abdominal surgery, and the peritoneal cavity is opened on the median side of the abscess and the intestines packed off with sterilized gauze before the abscess is opened, that the risk of removing the appendix is more than counterbalanced by the danger of leaving it with the possible sequelæ of secondary abscesses, pyæmia, or pulmonary complications.

To sum up, it would appear that if the operator is not an expert, or if the patient is seriously ill, it is better simply to drain the abscess, since the patient is not so likely to be further infected, and the time occupied by the operation will be very much curtailed. But should the appendix present in the wound it should be removed.

CHRONIC APPENDICITIS.

Chronic appendicitis may arise *de novo*, or it may be secondary to an acute attack.

Symptoms.

The symptoms of chronic appendicitis are mostly concerned with the digestion. The patient may suffer for years from loss of appetite, indigestion, flatulence, and constipation. In addition to these she will complain of a dull aching pain over the region of the appendix, and of flatulence and slight distension in this region. From time to time the pain may become acute, and the patient may feel ill enough to go to bed with, as she thinks, an "attack of indigestion" or a bilious attack. Such attacks vary in severity, and are due to a slight exacerbation of the disease; they are known as attacks of "recurring appendicitis" or of "appendicular colic."

In some cases the only indication of appendix trouble is that at intervals the patient is seized with very severe attacks of colic, lasting in some cases as long as an hour. The attack may be accompanied by vomiting. When the colic passes off, the patient soon feels quite well again.

Signs.

There is in many cases a certain amount of tenderness over the region of the appendix.

The appendix itself, whether diseased or not, is not palpable, but a swelling composed of thickened omentum and adherent bowel due to the local peritonitis is occasionally found. If on bimanual examination no pelvic swelling is discovered, the probability is that the case is one of appendicitis rather than salpingitis.

Diagnosis.

Chronic appendicitis must be diagnosed from chronic dyspepsia due to other causes, chronic salpingitis, gastritis, duodenal ulcer, and an habitually loaded cæcum.

Chronic Salpingitis.—After what has been said with reference to appendicitis and acute salpingitis, it is unnecessary to go much further into the differential diagnosis of the chronic varieties. In a certain proportion of women subjected to operation for chronic tubal disease, the appendix is found in a state of chronic inflammation, and adherent to the right Fallopian tube. Apart from this combination of disease, a chronic salpingitis will be as a rule associated with leucorrhœa, dysmenorrhœa, an increased menstrual

loss, sterility, perhaps dyspareunia, and a more or less fixed condition of the uterus, all of which symptoms and signs have no relation to the appendix *per se*.

In the chapter dealing with chronic salpingitis, it was noted that a woman suffering from this disease was subject to recurring attacks of the disease, and to this extent the condition might be mistaken for a "recurring appendicitis." A consideration of the history and an examination of the pelvis should, however, insure a correct diagnosis of salpingitis, apart from the question as to whether or no the appendix is diseased in addition.

Gastritis and Duodenal Ulcer.—The symptoms associated with these diseases have a general likeness to those of chronic appendicitis, inasmuch as in all these cases dyspeptic troubles are the chief subject of complaint. In many cases, moreover, these diseases will be found to be associated with a chronically inflamed appendix.

Loaded Cæcum.—One of the commonest complaints in the gynæcological department is that of pain over the sigmoid flexure associated with constipation. In such cases a course of Epsom salts often works wonders. The pain is undoubtedly due to irritation and stretching of the sigmoid by an accumulation of fæcal matter. The cæcum may be subject to the same condition, and many women who, because of pain in the region of this organ, think they have appendicitis are cured by similar treatment.

Treatment.

The appendix should be removed in all cases of chronic appendicitis.

The operations for appendicitis include removing the appendix when it is found diseased during the course of an abdominal operation, removing the appendix as a primary operation, draining an appendix abscess, and draining the peritoneal cavity in the presence of general peritonitis.

Removing the Appendix when it is found Diseased during the Course of an Abdominal Operation.—During an operation for salpingitis, the appendix is often found so diseased and adherent to the right appendages that it has to be removed. Apart from this, the appendix may be found to be the seat of disease quite unexpectedly.

The appendix, having been separated from the right appendages or any other organ to which it is adherent, is gently put upon the stretch with the fingers: and the meso-appendix is then clamped, the

points of the forceps infringing on the cæcum at the root of the appendix. The meso-appendix is then divided along that edge of the forceps distal from the cæcum, and thus set free. The vessels in the meso-appendix held by the forceps are now secured with a catgut ligature, which is inserted at the junction of the appendix and cæcum, and tied as the forceps is removed.

The base of the appendix having been crushed by forceps, a catgut ligature is now passed round it at the site of the crushing. The ligature is then tied, and the appendix is again clamped just distal to the ligature, and then divided between the ligature and forceps. The raw edge of the stump is then dressed with a little carbolic acid on a probe, after which it is buried in the cæcum as follows:

A purse-string suture is passed round the stump of the appendix about a quarter of an inch from its base, through the peritoneal and muscular coats. As this suture is tied, the stump of the appendix is pushed inwards towards the cæcum, and thus buried.

Removing the Appendix as a Primary Operation.—The method of removing the appendix is similar to that already described.

It is only necessary, therefore, to describe briefly the various methods of opening the abdomen to get to the appendix.

Gridiron Incision.—This is the usual incision employed in appendicitis. The skin is divided by an oblique incision about 4 inches long, passing through the junction of the middle and lower third of a line joining the anterior superior spine and the umbilicus. The aponeurosis of the external oblique, including any fibres of that muscle which may be present, is divided along the whole length of the incision. The internal oblique and transversalis are then split in the direction of their fibres, which is at right angles to the incision in the aponeurosis. The edges having been retracted, the peritoneum will come into view, and this is picked up with a pair of forceps and incised in the direction of the primary incision.

Battle's Incision.—This incision is the most useful if the diagnosis is in doubt, as the genital organs can be more easily palpated; in fact, through a gridiron incision, only the right appendages can be palpated, and these with difficulty.

By this method the abdominal cavity is opened by a vertical incision 3 inches long, passing through the centre of a line drawn between the anterior superior spine and the umbilicus.

The anterior wall of the sheath of the rectus is opened, the muscle itself drawn inwards, and then the posterior wall of the sheath and peritoneum are incised.

Draining an Appendix Abscess.—The abdominal parietes are divided by one or other of the above incisions, any adhesions are separated, and the pus is evacuated. The appendix is now removed in the manner already described, but it may be very difficult to find, and how far the operator should persist in his attempt has been discussed already. A large drainage-tube is inserted into the abscess cavity, and into the loin or pelvis if the abscess has burrowed in these directions.

If the general peritoneal cavity is opened, it should be at once closed by a continuous catgut suture.

Draining the Peritoneal Cavity.—The abdomen is opened in the middle line, as much pus mopped out as is possible, and drainage-tubes are then inserted by means of counter-openings into both loins, and also a drainage-tube is inserted into the pelvis.

Section XI.

CHRONIC ILL-HEALTH IN WOMEN FROM THE PSYCHOLOGICAL ASPECT: NEURASTHENIA IN RELATION TO PELVIC DISORDERS

A considerable proportion of the gynæcological patients seen in the out-patient department of hospitals, and still more in private practice, are of the type tersely described as "always ailing and never ill." These chronic invalids or semi-invalids complain of a multitude of pains and aches—backache, chronic abdominal pain, and bearing-down pain; of being easily fatigued and incapable of performing their ordinary duties without distress; and often of leucorrhœa, menorrhagia, or some trifling pelvic prolapse—and form a class difficult to describe because of its infinite variety. The incapacity of these patients is crippling to their usefulness, and taxes the patience of husbands and relatives to a degree which may cause much domestic unhappiness and discomfort, and thus calls [illegible] help that a medical attendant can offer both to the afflicted [illegible] and her equally afflicted family. When this chronic ill-[illegible]s unaccompanied by any discoverable lesion or by some [illegible] disturbance, which appears to cause effects out of all proportion to its apparent clinical importance, much more care is required in its investigation, and much more judgment in its management, than in the far simpler problems which are presented by cases in which a distinct inflammatory mass or new formation points clearly to surgical interference.

In the majority of these cases of chronic ill-health, there is a large element of neurasthenia—*i.e.*, the presence of symptoms pointing to a general exhaustion of the nervous system or to some particular function of it. Such symptoms are characterized by a generally increased nervous irritability ("over-reaction") and a diminished capacity of resisting painful or disturbing impressions.

Their presence indicates fatigue or malnutrition, or perhaps poisoning of that part of the higher nervous system which we cannot localize, but which we vaguely term the "mind." A healthy mind is at least as important for the enjoyment of good health as a healthy body, and in its absence bodily sensations are apt to usurp a position far more important than they deserve, and to cause disturbances out of all proportion to their intrinsic value. Backache in women, although often the result of organic pelvic disorders, may be merely an expression of nervous and mental exhaustion which can never be alleviated by remedies solely directed to the spine and neighbouring tissues. The site of pain, whether in the back or elsewhere, may be determined by some slight physical defect, or even by some mental idea; but unless the patient's general morale or resistance can be raised to a higher plane, local treatment must inevitably end in failure. Although it is impossible to describe pathological lesions characteristic of neurasthenia, the conditions which predispose to its occurrence, and the symptoms grouped under neurasthenia, are clearly recognized in practice.

Cause.

Reference must be made to treatises on general medicine for the causation and symptoms of neurasthenia in general. Here attention need only be directed to those types presenting symptoms suggesting pelvic disturbance or associated with minor pelvic lesions. Maternity, or rather what it may involve, is a sufficient explanation of the frequency of such cases. Too frequently recurring pregnancy and labour, with the nursing and rearing of a family, are well recognized as a prolific cause of both mental and physical breakdown, especially amongst those whose domestic life is one long struggle to bring up the family and keep up appearances on slender resources. The disappointment of the unhappily mated or of the barren woman with the unsatisfied maternal instinct, or the unmarried woman with no satisfactory substitute for the same instinct, the mental distress of the pregnant single woman, the revenge of Nature against the artificial prevention of conception, are all instances in which "the woman pays."

In women with a family history of nervous instability, the inherited weakness of the nervous system may show itself in childhood or at puberty, but more often it is not till adult life is reached that circumstances arise to test the strength of the machine and prove that it is below the average in power. In this way environment plays an important determining factor: for just as the physically weak, if living under conditions which do not call for the exhibition

of physical strength, may maintain themselves with little handicap in the struggle for existence, so the weak nervous system may serve its purpose provided it is not tested by any severe strain. Thus, neurasthenia is found especially among the more highly civilized communities, among those living in big towns and busy centres rather than in rural districts, and among those who work with the head rather than with the hands. Its chief incidence is from young adult to middle life—*i.e.*, from the age at which work and responsibility are undertaken till advancing years bring a lessening of the burden of work, and degenerative changes rather than exhaustion alone must be considered as the predominant factor. Professional overwork, business and financial anxieties, which in men are the chief agents in the production of neurasthenia, also in women, with their entrance into the professions and commerce, form an occasional cause, but, naturally, are not so likely to determine a pelvic type as are those causes of a more purely sexual character.

Symptoms.

It is extremely difficult to give the student a definite picture of these cases, owing to their extraordinary variation in symptoms and type. The most characteristic features are morbid sensations with increased susceptibility to painful impressions, and often a loss of muscular strength with general weakness and feebleness of all the bodily functions. On the other hand, many patients are stout, and some are muscularly well developed. Backache, bearing-down pain, abdominal pain, aching in the groins, dysmenorrhœa, dyspareunia, and various morbid sensations in the abdomen and pelvis, described with more or less picturesqueness, according to the patient's powers of expression, are common symptoms. Many of these troubles may be of long duration—the patient will often say "For years," if asked how long she has suffered—and are unaccompanied by any general symptoms of constitutional disturbance, such as rise of temperature or increase of the pulse-rate. They may be present only when the woman is hard-worked or run down, and absent when she is on holiday or in good health; they may be relieved while she is in bed and resting, and occur only after she has been on her feet for some time. Many of the symptoms are the effect of fatigue, but, unfortunately, the fatigue effects show themselves on very slight provocation, so that many patients may be said to wake up tired. The patient may be a chronic invalid, or she may be a hard-working, energetic woman with the enjoyment of her daily round marred by a constant ache. The temperament of the patients is as variable as their symptoms. Some are emotional and

subject to depression, with irritability and loss of power of concentration, which may alternate with periods of high spirits and excitement. They go up like a rocket and come down like the stick. Many are highly introspective, and study and analyze their pains and aches, of the character and distribution of which detailed descriptions are often given, and of the appearance of the tongue, deposits in the urine, strange objects in, and shape of, the motions, etc. There is also a tendency to exaggerate their symptoms, and an occasional pain becomes a constant agony and profuse menstruation a dangerous flooding. The most marked instances of this type will bring with them a carefully compiled record of their ailments, which they propose to read through to their medical adviser. In others this dwelling on their ailments takes a different turn, and, without discussing or describing them to friends or physician, they may keep their maladies long to themselves, for fear they should be pronounced to be cancer or tumour, and their mental distress adds further to their nervous exhaustion. Hysterical and emotional outbreaks are rare, and true malingering extremely rare; but in most cases there is decided craving for sympathy, which, if pandered to by friends or medical attendant, aggravates the condition. This desire for sympathy is shown by the exaggeration of their symptoms, by the fondness for describing and discussing them with friends, nurses, and doctors, and by generally dressing for, and playing up to, the part of an interesting invalid. It leads to their consulting many physicians and trying many forms of treatment.

Relation of Symptoms to Physical Signs.—Some patients may have no physical signs of any kind, but many of them show, to a greater or lesser degree, slight disturbance or disease of the abdominal and pelvic organs, and the truth of the first aphorism of Hippocrates is nowhere better illustrated than in the correct estimation of the relative importance to the patient's symptoms of such minor deviations from the normal, and in forming a correct judgment as to treatment. These knotty problems are regarded from almost as many different aspects as there are healers of the body. Some will be satisfied that there is an obvious mechanical explanation for every ache or pain a patient may complain of, and will be content with the discovery of some usual or unusual position of the uterus or ovary, or a laceration or erosion of the cervix. Some of these may be a cause of the patient's symptoms, but often, if the physical examination does not afford a sufficient explanation, a hypothetical congestion of the ovary, or a varicose condition of the veins of the broad ligament, or the presence of some unexpected adhesion in the abdomen or pelvis, is invoked. The appendix is sometimes the

cause, has a deservedly bad name, and, if not already removed, often suffers the extreme penalty. The operation for its removal in cases without acute symptoms is simple, and under modern conditions the risk is so slight that, when it is thought to be a possible cause of chronic abdominal pain, it is frequently removed on suspicion. Happily, the patient is as well without her appendix; and should the pain persist, there are always the inevitable adhesions left to explain the old pain in the place where the appendix had been. Far otherwise is it with the harmless necessary ovary. So far as inflammatory troubles are concerned, it has little original sin. It is corrupted by evil communications in the shape of the neighbouring tube, but little is known of any primary infection. Yet it is undeservedly blamed for the sub-umbilical pain common on the left side. Tenderness in this region is presumed to be "ovarian" tenderness, and "ovaritis" is diagnosed, in spite of the fact that there is no physical evidence of any change in the ovary. Hyperæsthesia in this area, or tenderness of the ovary on bimanual examination, should not be called "congestion of the ovary" or "ovaritis," in the absence of physical signs. The terms thus used are unscientific and have no pathological basis, and can be excused only as employed merely to satisfy the patient by giving her trouble a name, and not because there is any clinical justification for them. Many an innocent ovary has been sacrificed on very slender evidence of guilt, especially at the hands of those who have developed a taste for operating without the restraining influence of gynæcological experience or a proper knowledge of the pathology of the pelvic organs. A few small follicular cysts are noticed, and the ovary is condemned as "cystic," perhaps on the supposition that they may be the forerunners of a cystic adenoma; or it is described as "apoplectic" or "hæmorrhagic" because a large fresh corpus luteum is found; or as "cirrhotic," because it is small and shrivelled; and in some such way an excuse is made for its removal. Unfortunately, this is so simple a procedure in the case of a movable, non-adherent ovary, that, to those with a primitive idea of the origin of pain, it seems the easiest and shortest means of cure to remove the organ to which the pain is ascribed. To remove the ovary for neuralgic pain is as unreasonable as to remove the eye for supraorbital neuralgia.

Others assign a chemical explanation to the ill health and neuralgic pains, and the more up-to-date variations of the older ideas of the gouty diathesis have their adherents. The blame is then laid on some toxic agent absorbed from the mouth or intestine, or from the endometrium or cervical mucosa, or elsewhere, and, if all else fails, there is always some disturbance of the internal secretions of the

ductless glands to fall back upon. The exponents of these doctrines will pin their faith to vaccine injections, a course of organo-therapy, or some drastic operation such as colectomy

Then there are those who feel they have settled the whole problem when the case has been labelled "neurosis," and think that, once the patient has been told "there is nothing the matter with her," their responsibility is over, and the patient's business is now to live up to their diagnosis and be well, which, unfortunately, she often perversely refuses to do.

Probably, in most of these cases of what we may term "pelvic ill health," there are several factors present, and it is impossible to lay down any rule to guide the student in forming an estimate of their relative importance; all that can be done is to suggest the various points of view from which such cases may be regarded with a view to treatment. The student must endeavour to check all simple and traditional explanations as to the cause of symptoms by what he sees, and look forward to the time when his own experience will enable him to test the views of his books and his teachers. What most of all he must bear in mind is that the ailments of these patients are not imaginary, but very real, that their incapacity and invalidism is very crippling to them, and that, especially in those cases in which no easy road to a speedy cure by a surgical operation is available, the longer and more tedious route by general medical measures and management can only succeed by the exercise of patience and judgment.

It will now be best to consider the conditions found with those symptoms more especially referred to the pelvis. The symptoms of general neurasthenia will be found in textbooks on general medicine.

Perhaps the most frequent complaint is backache, of which the possible causes have already been enumerated (p. 94). Sacral and lumbar pain is present with many pelvic conditions, but is perhaps most commonly seen with abdominal and pelvic muscular weakness. With it there may be some hyperæsthesia over the vertebral spines. Backache and dragging pain are met with especially in enteroptosis and pelvic floor prolapse, but are also caused by abdominal tumours, such as pregnancy, fibroid and ovarian tumours, and by obesity, owing, no doubt, to the drag on the abdominal and pelvic connective tissue. They are aggravated by fatigue, and in cases of feeble muscular development will be produced with little or no evidence of prolapse of viscera. Backache is often very chronic, and with many women may be habitual to some degree. Though more common with anæmia, feeble muscular development, and obesity,

it may be present in upstanding, well-built women. It is generally relieved by rest, and aggravated by being on the feet for long, by constipation, and during menstruation. Sometimes it is worse when in bed at night or on rising in the morning. It is probably very largely a fatigue effect, and is produced much more by standing about and by indoor duties than by active exercise out of doors. It occurs in men as the result of some exceptionally tiring work, but its enormously greater incidence among women depends on many factors—feebler muscular development, less active life, the relaxation and muscular weakness due to child-bearing, and perhaps the wearing of corsets, which may cause some loss of power in the muscles of the back, and so a lessened ability to maintain the erect position without fatigue. Sacral backache and coccygodynia seem more especially associated with disease or disturbance of the uterus and its appendages, the vagina and rectum, than dorsal and lumbar backache. All these forms of backache are rare in young women except chlorotic or overgrown and undeveloped girls. It generally appears after the free and unrestrained period of girlhood is passed and the more restrained life of womanhood has begun, but is most common after marriage and child-bearing. After child-bearing especially it is often associated with what is described by women as a "bearing-down pain," or a pain suggestive of the character of the expulsive pains of the second stage of labour. Sometimes it is definitely described as a feeling of something being forced down the vagina. Some degree of pelvic floor weakness or chronic constipation and hæmorrhoids are frequently found as the provoking cause. Abdominal pain of some kind is a very frequent symptom, and perhaps the commonest is pain, generally on the left side, about midway between the umbilicus and the anterior superior spine, commonly termed "ovarian pain," on the supposition that it is referred from the ovary. The pain is less frequent on the right side, and when it is right-sided the appendix is naturally thought of as a possible cause. The pain may be widely distributed over the lower abdomen, shooting over the groins and into the thighs, or over the iliac crests to the hips. Aching in the groins is most often associated with weakness of the abdominal wall and enteroptosis, but may be present without any evidence of muscular weakness. These abdominal pains are of all kinds—shooting and stabbing pains, aching and burning pains, and so on—and have been described, in the absence of any physical evidence of disease, as "functional" or as "visceral neuralgias" or "referred pains," useful terms in the present state of our knowledge, but not to be considered as having any claim to scientific accuracy or permanence.

Besides the absence of physical signs, the general characteristics which distinguish these abdominal and pelvic pains from those due to chronic pelvic inflammation are that they are habitual, are unaccompanied by fever, rise of pulse-rate, or other evidence of general disturbance; are rarely of such severity as to make the patient take to bed and give up her ordinary occupations, and do not, as a rule, appear to cause serious deterioration of the general health. All symptoms associated with neurasthenia are aggravated by menstruation, and some are only noticed at that time. Besides the general pelvic congestion, the part played by nervous exhaustion in increasing the susceptibility to pain and discomfort during menstruation has already been discussed under dysmenorrhœa. The nervous influences in the production of dysmenorrhœa are shown by (1) the onset of dysmenorrhœa being commonly in early adult life and some years after puberty—*i.e.*, when the free, active life of the girl gives place to the duties and responsibilities of womanhood; (2) the frequency with which overstrain, illness, or some exacting occupation, determines its onset; (3) its greater frequency among the professional classes and indoor workers, such as students, shop-girls, typists, and domestic servants; (4) its variations in severity from month to month, so that it may be absent altogether, or so slight as to pass unnoticed, during holidays or when leading a healthy outdoor life; (5) its frequent association with symptoms of general nervous disturbance of a migraine-like character: headache, sickness, dislike of noise and light, and general depression. Definitely colicky or spasmodic pain is suggestive of painful uterine or intestinal contraction, and should always lead to a careful investigation for any condition which may produce either of these. A small submucous fibroid in the process of extrusion, for instance, may cause painful uterine contractions, and is easily overlooked, though the hæmorrhage accompanying it ought to put the case quite outside the category of those at present under consideration. So also with carcinoma of the body of the uterus, in which uterine colic is sometimes a marked feature. Bowel pains are generally of much wider area, and not localized to the lower abdomen; they occur with indigestion and flatulence, and are often accompanied with distension, eructations, borborygmi, and constipation. The acute paroxysmal attacks which accompany biliary and renal colic must be kept in mind, as there may be no physical signs with them: but here their severity and the collapse with sweating, which is often present, generally serve to distinguish them. Occasionally pyelitis due to the bacillus coli may cause paroxysmal pain, but there is usually fever and general disturbance with it, and an investigation

of the urine should be made. Other possible causes of abdomino-pelvic pain have been mentioned on p. 93.

In addition to dysmenorrhœa, other disturbances of menstruation are met with in neurasthenic states. Amenorrhœa is not infrequent, both as the result of a sudden shock or severe emotion, such as the death of a near relative in distressing circumstances, and of overwork and consequent ill health. Occasionally a premature menopause may occur in this way, with all its attendant symptoms. Irregularity of menstruation and menorrhagia are also met with, though less commonly, possibly as the result of some vasomotor disturbance; but in this connection it is as well to bear in mind the tendency to exaggeration in neurasthenics, especially if the absence of anæmia and the general appearance of the patient do not bear out her story of excessive loss.

Disturbances of micturition, especially frequency, are also common complaints. Burning and scalding pain may be complained of without any local evidence of disease or any abnormality of the urine. Frequency of micturition, precipitate micturition, and inefficient control on sudden straining, are often associated with minor degrees of cystocele or dislocation of the neck of the bladder, though sometimes no physical signs are discovered (see p. 515), and are then noticed chiefly when the patient is up and about. With cystitis frequency of micturition will be present day and night, and the changes in the urine are characteristic. When the nervous element predominates, the desire to micturate becomes most insistent when in company or under awkward and unfavourable conditions, as in church, when travelling, at social functions, or under emotion.

Retention of urine without local pelvic signs is due to either organic or functional nervous disease. It is an occasional symptom of hysteria in girls, but is most frequently met with as a functional nervous disturbance after childbirth or operation. In the latter case it rarely lasts more than a day or two, but occasionally may be persistent and troublesome in well-marked post-operative neurasthenia.

Dyspareunia (see p. 103) is sometimes found without any local cause being discoverable. At the commencement of married life it may be the result of nervous apprehension and dread, and when acquired later may often be traced to sexual causes, such as sexual excess, marital unhappiness, disappointed maternal instinct, or long-continued efforts to prevent conception.

Diagnosis.

No cases met with in women require more thorough and careful investigation than those under consideration. Chronic ill health and ailing without adequate cause can only be ascribed to neurasthenia when an exhaustive examination has excluded gross disease. A few minutes will reveal an abdominal or pelvic new growth; a history of recurrent attacks of abdominal pain with fever and general constitutional disturbance, and the discovery of an inflammatory mass in the pelvis, will soon decide the origin of the trouble, and the treatment for such conditions is simple and straightforward. But it is essential that, because the woman presents definite symptoms of neurasthenia, it should not be assumed that gross disease is absent. Neurasthenia is frequently consequent on other disease —for instance, uterine fibroids and chronic pelvic inflammation. Though it is important to recognize that symptoms of nervous exhaustion are present and may delay convalescence, the essential matter in treatment is the primary cause. An effort must be made to keep the mind from being influenced by emotional and highly strung women with well-marked introspective tendency, who by their vivid and minute descriptions of ailments of all sorts and kinds may be looked on at the start as "neurotic," and a bias given to the investigation of their case. Such women are as liable to grave disease as their more phlegmatic and unemotional sisters. They are especially dangerous to the family practitioner, who has known them for long and found his estimate of their character and temperament proved by many false alarms. That they have cried "Wolf!" many times does not make it safe to presume on their alarm always being without justification. When a complete investigation has been made, and has revealed no adequate physical explanation of the symptoms, it is generally necessary to go carefully into the history again, and interrogate the patient as to her mode of life, conditions at home or at work, interests and occupations, and so on. In difficult cases an examination under anæsthesia may be required, and what is often most helpful is to have the patient under observation by skilled nurses, preferably away from home and friends, so that independent evidence may be obtainable. The tendency to exaggeration and the greed of sympathy make it necessary to check the patient's account of her symptoms by observation and independent testimony. If alcoholism or other drug habit is suspected, this method of investigation is essential to a proper perspective of the case.

When the investigation is complete, the individual temperament

of the patient must be taken into account, and an attempt made to weigh the relative importance of the various factors. Trifling disturbances may produce an unusual effect on the patient, and the question will arise as to whether it will be better to make little of these minor matters, lest her attention be unduly concentrated on them, or whether they should be treated respectfully, and the woman encouraged to believe that once they are put right she will be well. This is ever a difficult problem; the number of women who have never been well since they were told of a "floating kidney" or a "misplaced" or "ulcerated" womb, or that they were "inwardly torn," is legion. Whilst recognizing the danger of making too much of trifling disorders, all disturbing factors, physical and mental, which can be removed, should as far as possible be eliminated. Her troubles are very real to herself, and no good is gained by telling her they are imaginary. Her incapacity is a very serious matter to her and to those who may be dependent on her health and strength, and should she get the idea that her case is not "understood," or lose confidence in her medical adviser, his power to help her is at once enormously reduced. Very often the knowledge that there is nothing serious the matter may in itself work wonders, especially in those who have suffered much anxiety from the fear of cancer or growth; but the tendency is for an effect of this kind to be temporary. Nowhere in the realm of medicine is it more necessary that each individual case should be considered on its merits, and the personal characteristics of the patient and her circumstances taken into account.

Varieties and Types.—A common type is the thin spare woman, with feeble muscular development, a poor appetite and digestion, costive bowels, cold hands and feet, and generally "flabby." The abdominal wall is lax, allowing of easy palpation of the viscera, and making the pulsation of the abdominal aorta unusually evident, so that it thrusts itself on the notice. The peristaltic movements of the bowel may be visible, and some degree of enteroptosis is frequently present, the right kidney being readily palpable and unduly mobile, perhaps descending low enough with respiration to enable it to be retained below the costal margin by the thumb. The liver edge also may be low and easily felt. There is a relaxed vulval outlet, with perhaps slight gaping on coughing; and although the patient notices no protrusion, she may complain of sensations of "bearing down." The uterus is unenlarged, retroverted, and very freely movable. The uterine appendages are easily palpable bimanually through the flaccid abdominal wall, and are perfectly normal. The backache and bearing-down pain, with abdominal

pains, dyspepsia, flatulent distension, and constipation, produce constant ill health and ailing. Treves has given a word picture of an extreme case of this nature, which is well worth quoting, as it illustrates many of the characteristics already mentioned:

"An unmarried lady consulted me with regard to what she was assured was a stricture of the colon. She had persistent pain and very marked tenderness at a spot just above and to the left of the umbilicus. . . . The stricture was supposed to be situated at this spot. She had frequent vomiting, which appeared in 'attacks.' The vomited matter was small in amount and usually intensely acid. Her bowels were confined, and she described her motions as containing many strange and wondrous things. An examination of one of these remarkable stools revealed nothing unusual except much undigested food and much mucus. The patient was thin and pallid. She was too weak to follow any other engrossing pursuit, but she had made a great study of her malady. The abdominal pain had begun ten years previously, and since that time she had had manifold illnesses. She had written out an account of these disorders with much care. They seem all to have been of an acute and exceptional character, and included 'malignant sore throat,' 'internal abscess,' 'spinal exhaustion,' 'neuralgia,' and certain smaller troubles. She had had uterine troubles of bewildering complexity. She spoke of her kidneys with precision and of her liver with regret. The former organs were prone to an unreasonable congestion, and the latter to an 'obstinacy' which appears to have been little short of intelligent. She had been to many health-resorts, and had taken 'medicine' for the ten years concerned. She was certainly feeble, anæmic, and intensely neurotic. The abdominal pain was at times agonizing, and her friends were driven to desperation by an illness which seemed unending and filled with tortures. The abdomen was flabby, and revealed nothing beyond a general ptosis of the abdominal viscera of moderate degree. The kidneys were both slightly movable. As all medical measures had failed, as the patient was leading the miserable life of a chronic invalid, and as her friends were convinced that 'she *must* have something wrong,' an abdominal exploration was done, and, except for a moderate but general prolapse of the viscera, every organ was found perfectly normal; but the exploration cured the patient of her abdominal symptoms, even of the vomiting and pain."

An illustration of the different way in which the same condition may affect a patient of another temperament is well seen in another case from the same article, in which extensive prolapse of all the viscera was present to such a degree that the liver formed an abdominal tumour in the erect position, for which the patient sought advice. The description of this patient is as follows:

"She was a placid person who lived at her ease, and was at peace with herself and with all men. She stated that she was not strong, but that she lived carefully and enjoyed excellent health. The 'tumour' had disturbed her in no way, and had merely aroused an amused curiosity. She was feebly pleased to hear that she could continue to take 'carriage exercise.'"

These are cases as seen through the eyes of the general surgeon. One more quotation may be made, as it pictures a type which often exhibits pelvic as well as general nervous symptoms:

Clifford Allbutt, in describing anorexia nervosa, says:

"When for many months food has been taken in utterly inadequate quantities, neurasthenia (in its etymological sense) must follow, and asthenia of all and any other systems of the emaciated body; yet it is a remarkable character of these patients that they continue capable of occupations, interests, and even of efforts, which, if not in themselves extraordinary, are at least astonishing in such frailty. A young woman thus afflicted, her clothes scarcely hanging together on her anatomy, her pulse slow and slack, her temperature two degrees below the normal mean, her bowels closed, her hair like that of a corpse, dry and lustreless, her face and limbs ashy and cold, her hollow eyes the only vivid thing about her—this wan creature, whose daily food might lie on a crown piece, will be busy with mothers' meetings, with little sisters' frocks, with University extension, and with what you please else of unselfish effort, yet on what funds God only knows. At mealtimes her mother may cry, her father may storm, her friends may banter, and the cheerful reply never fails, that she has eaten amply; or if not, that she can eat no more."

Naturally, there is a tendency on the part of those doing special work to concentrate their attention on the matters that come within their realm. If the physician ascribes the symptoms to neurasthenia and the functions specially affected by it, the general surgeon tends to turn to enteroptosis, and particularly to nephroptosis, or to the appendix or other favoured culprit. So also the gynæcologist is tempted to give the predominant place to what pelvic disturbance he can find. Thus, though there may be general weakness of the abdominal musculature, with prolapse of viscera as well as pelvic floor weakness, the latter may receive disproportionate attention; and a backward displacement of the uterus, which is but part and parcel of a much more general weakness, is singled out for treatment. There are still to be found in the ranks of gynæcology some who would ascribe to a simple uncomplicated retroversion the thousand natural shocks that female flesh is heir to—from headache and indigestion to piles and varicose veins. The same narrow outlook has led some surgeons to attempt the cure of anything from lumbago to general paralysis of the insane by a nephropexy.

A type, apparently, of the opposite extreme is the stout flabby woman with a thick abdominal wall. These women tire easily, and frequently complain of backache and "bearing-down." On standing up, the typical "hang-belly" appearance is seen, and a hand under the mass which hangs over the pubes will readily appreciate the weight and drag it must mean. These women often suffer

from some degree of genital prolapse also, which, in many cases, forms but a trifling addition to the abdominal discomfort. Chronic constipation and hæmorrhoids may add to their troubles. It can be readily understood that even a slight degree of neurasthenia in such subjects is equivalent to an enormous increase in the burden they have to bear.

Again, a strong, well-developed, and apparently healthy woman who leads an active life and is in no way emotional, may complain of backache and abdominal pain, without general disturbance or any local physical evidence of disease, often in consequence of some extra strain, physical or mental, such as attendance on a sick family, additional home duties owing to want of servants, or a too arduous season in town. If careful examination and observation for some time fails to give further explanation, treatment on purely general lines—holiday, fresh air, and exercise, or change of occupation and interest—will often result in a cure without further cause of the trouble being discovered.

From what has been said, it will be clear that the most frequent minor pelvic trouble found in chronic invalidism is some degree of pelvic floor weakness, with which is included retroversion of the uterus, for it is not the displacement *per se* that is of moment, but the conditions which produce it, and the striking point is the marked difference in the degree of suffering and incapacity which such minor disturbances cause. One patient may seek advice only because of the discomfort of a marked protrusion at the vulva, of some years' standing; whereas another, with no protrusion at all and little to show in the way of descent, will complain, after her first labour, that she is not the same woman and cannot attend to even light household duties. The difficulty in laying down any hard-and-fast rule is well shown in any hospital out-patient department, in which patients may be seen with an uncomplicated retroversion discovered by routine examination, giving rise to no symptoms whatsoever; others with all the classical symptoms of retroversion, but with the uterus in anteversion; and some with the symptoms, and the uterus duly retroverted. Unfortunately, a hospital out-patient department is quite unsuited for the investigation of these patients, as the temperament and nervous state of each individual must be taken into consideration, her work and home conditions and so on. Without a knowledge of these matters it is impossible to decide whether it is the pelvic condition or the general nervous condition which chiefly requires attention. The divergence of opinion about such cases is well shown by differences in practice: some will adopt pessary treatment, others will advise operative

treatment, and others, again, will decide against any local treatment. For instance, there is great divergence as to the indications for suspension or fixation of the uterus: with some it is the commonest operation in gynæcology, with others the rarest, and all owing to a bed-rock difference in the view that is taken of the importance of the nervous element in the patient's ill health.

Undue attention has also been paid to such common and minor troubles as laceration, erosion, and mucous polypus of the cervix as a cause of pelvic pain. They cause leucorrhœa, and may be complicated by some degree of prolapse, but in themselves cannot be considered an adequate explanation of pain. The cervix is a remarkably insensitive structure, which may be seized by a volsellum without the patient noticing it, though dragging on it will at once cause aching. Even when affected by extensive malignant disease it is painless; indeed, the absence of pain is one of the reasons why many cases of cancer come so late under observation. Laceration of the cervix to some degree is almost universal in multiparous women, and hence cannot be considered as a cause of pain, and operations done to remedy it, in the hope of curing pains, are likely to lead to disappointment.

The varicose and dilated veins in the broad ligament have also been credited with causing aching and dragging pains, but these veins are often found extremely large and dilated with pregnancy, ovarian cysts, or fibroid tumours, without causing any special symptoms. Large veins of this kind are frequently met with in the broad ligament without symptoms, just as is the case with varicocele in the male.

There is no need to discuss these questions further. The student must recognize that subjective symptoms without objective signs being discovered after thorough investigation and careful observation, generally mean a large element of nervous exhaustion and that this requires attention. In some cases the nervous symptoms preponderate: the woman is emotional and lacking in self-control, depressed and sleepless, and subject to headaches and neuralgia; and with these there may be some pelvic symptoms which have directed the attention of the patient or her medical advisers in that direction. When once it has been satisfactorily established that the pelvic condition is of little moment, it is clear that treatment must be directed to the general nervous condition. Similar symptoms are seen as the result of major pelvic disorders, especially from the drain of profuse menstrual losses over long periods, as with uterine fibroids, in which case some operation is urgently called for. Such cases give rise to considerable anxiety, as the strain of the

operation may add to the nervous prostration and the possibility of a mental breakdown cannot be lost sight of. Sometimes it may be advisable to keep the patient in bed, isolated, and under the care of nurses for some weeks before operation. In all such cases a slow and protracted convalescence is to be expected, as the recovery from the operation is much more rapid than from the neurasthenia.

Post-operative neurasthenia is a cause of great disappointment to the surgeon, the patient, and her friends. She remains an invalid or semi-invalid for months without there being any obvious reason for it. It is especially liable to occur in such cases as those mentione above—long-continued illness owing to operation being postponed much later than it should be, and in women of a highly-strung nervous temperament who have worked themselves up to face an operation, and collapse nervously after it is over. Naturally, also, it is more likely to occur after any toxic condition, whether a long-standing toxæmia before the operation or a post-operative infection, or after a severe operation with much shock or loss of blood. But it may occur after trifling operations, and even after mere examination under anæsthesia. The patient may exhibit signs of want of control immediately after the operation, and suffer severely from vomiting, distension, and all the post-anæsthetic and post-operative discomforts. Retention of urine may occur, and necessitate the use of the catheter for days or weeks. She may sleep badly and remain listless and difficult to rouse or to interest in anything but her own discomforts: little food will be taken, and all noise and bright light or movement resented. Such cases are rarely seen in a hospital, where a ward full of other patients, many of them more seriously ill than herself, seems to have a stimulating effect on recovery and an inhibiting effect on the self centred, introspective attitude which favours the development of this condition. It is more common in patients who have a room to themselves, and where for the time being they are the one and only operation case, and where they have no opportunity of obtaining a proper perspective of their case in relation to others. They are disinclined to get up from bed and to begin walking; they tire at once, and generally show other signs of neurasthenia. A year and more may pass before recovery is complete.

In the same way cases of neurasthenia occur after childbirth. The type already mentioned of the woman who has had many children in quick succession, so that she is worn out, is easily understood. So is the case of the woman who has had severe ante- or post-partum bleeding or some puerperal intoxication. But every

now and then cases of strong, healthy women are met with who are more or less invalided after their first confinement, and that uncomplicated by bleeding or sepsis. Many patients will say they have never been well since their first confinement, and to the mind of many will come instances of the husband who complains that his wife has never been the same woman since her baby was born. Some of them may have suffered more than usual from the minor ailments of pregnancy, and the culminating episode of labour and the care of the newborn infant seems to be too great a strain on their nervous system. They complain, when they get up, of a sensation of weakness and ' ing down, of various pains of the character of abdominal and pelvic neuralgia, tire readily, and cannot resume their household duties. In many of these cases there may be a slight element of abdominal and pelvic floor weakness which determines their ailing in that direction, but the chief matter is the neurasthenia.

Treatment.

Here it is unnecessary to consider the treatment of neurasthenia, for it falls within the province of the neurologist, and is fully discussed in textbooks of medicine. Only suggestions as to the management of cases as described will be considered.

When, after a thorough investigation, followed if need be by careful observation, the extent of the disturbance, if any, of the pelvic organs has been determined, the first question that arises is whether any local treatment is required.

In the minor degrees of prolapse in parous women, there is little objection to pessary treatment, if symptoms are relieved and the patient obtains a sense of support and confidence. In childless unmarried women pessary treatment for an uncomplicated retroversion, in the presence of neurasthenic symptoms, should only be adopted with caution, and after careful consideration. It may concentrate her attention on her pelvic organs, increase the introspective habit, and generally confirm the neurasthenia. Douches, provided they are administered by the patient herself and not by a nurse, are harmless, but should never be advised without very definite indications, for a similar reason. In many cases a small operative procedure may be less open to objection than a pessary especially if the benefit from the pessary is slight or the patient complains, as she occasionally does, of discomfort or pain from its presence. The advantages of such operations as perineorrhaphy, colporrhaphy, or hysteropexy, over a pessary, are that replacement at intervals is not required, as all visits and manipulations for this purpose are mischievous. Also some relief will possibly be afforded

by the operation and so give confidence, and "suggestion" is a valuable aid to recovery, as shown by the effect of exploratory operations, such as that in the case quoted on p. 550. The effect of the complete rest and change which operation involves is often well illustrated in hospital among the overworked mothers, who have their first relief for years in the few weeks in hospital, the only time they have been free from the care of children; for even during their lying-in times they have to keep one eye on the family, and the other on the husband. The chief objection to an operation is the danger of a post-operative neurasthenia aggravating the condition. The cases with marked emotional symptoms and loss of control are unsuitable for operative treatment. Worn-out, tired women, and chronic cases with habitual backache, are rarely affected injuriously by operation.

Such procedures as applications to the cervix, cauterizing erosions, and so on, are especially objectionable in neurasthenic patients; indeed, it may be said that anything which involves repeated manipulations, especially at short intervals, is more liable to do harm than good. The old tinkering gynæcology was to blame for many pelvic neurasthenics. If the local condition is one that calls for treatment, an anæsthetic should be given and the treatment completed at one sitting. The use of tampons, ichthyol plugs, and such-like, are open to the same objection, that they tend to concentrate the woman's attention too much on her pelvic organs, and so magnify her troubles.

Much judgment must be exercised, therefore, in deciding on any local treatment, and if the pelvic condition is quite trifling it is often best to ignore it altogether.

When there is marked enteroptosis, and certainly if there is a prominent mass over the pubes in the erect position, a well-fitting corset belt is valuable. Abdominal belts are uncomfortable in hot weather, and many are heavy and cumbersome, so that, unless the condition is very decided, it is often better to trust to the effect of massage and exercises. Kidney pads and similar contrivances are useless and difficult of arrangement. The one important matter is that firm pressure is required on the lower abdominal wall and little on the upper, and that the belt should be put on in the recumbent position. Very often suitable corsets or a corset belt will do more than a surgical abdominal belt, and without its discomfort. In all cases in which neurasthenia is present, the conditions exciting it should be carefully inquired into, if need be by psycho-analysis—often a long and tedious process—and an effort made to remedy them. In a young girl with recently acquired dysmenorrhœa, it

may be that she is anæmic or out of health, overworked, or has recently had a severe illness from which she has not yet fully recovered; or the young mother has broken down under the strain of the charge and nursing of her baby, with her nights disturbed and her days occupied with her household duties. In such cases the first thing is relief from the strain, and rest—not always easy to arrange—and afterwards an open-air life, with exercise, gentle at first, and always stopping short of fatigue. Once the patient is hard and fit, the neurasthenia and most of the pains and aches will disappear, and the daily round will cease to be the burden it had become.

Massage and Swedish exercises are a help, especially in cases in which abdominal and pelvic floor weakness is present. Massage will improve the tone of the abdominal muscles and aid sleep. Swedish exercises directed especially toward the development of the abdominal, back, and leg muscles, are useful, but, unfortunately, they are dull and uninteresting and it is not easy to persuade patients to persist with them. A very useful exercise for the pelvic muscles is carried out by the patient lying on her back and resting on her elbows, drawing her feet under the buttocks and raising the pelvis as high as she can, so that she is somewhat in the Trendelenburg position. When in this position the levator ani is contracted at intervals "by squeezing hard, as if to hold a motion." A similar exercise may be done by the woman assuming a knee-elbow position, thus raising her buttocks as high as she can and repeating at intervals the contraction of the levator ani. The object in both these exercises is to take the strain of the abdominal and pelvic contents off the pelvic floor while the levator ani is contracting. But nothing does so much good as open-air treatment; fresh air and sunshine are the best tonics in the world. To begin with the patient should have a very quiet time in the open air, and gradually begin exercise as she feels able. Often it is difficult to make a start, for the backache begins at once; but with patience and persistence a short walk may be taken morning and afternoon, and gradually increased till active exercise of any kind, always avoiding fatigue, is possible. Naturally, the age and physique of the patient will decide how much can be done. Some patients obtain great benefit by undergoing treatment and "taking the waters" at some spa or natural bath, and for this there is no need to visit foreign resorts. Harrogate, Woodhall Spa, Strathpeffer, and Llandrindod Wells, offer excellent facilities. Many patients will follow religiously the ritual and regimen of the cure in a way they would never do at home; they will submit to a regulation of their hours of rest and exercise and

of their diet, and the taking of the waters will insure regular action of the bowels. Suggestion also plays its part in the "cure." The essential matter is, first, relief from occupation or duties, and, next, that the rest should be under as congenial conditions as can be. Drugs are not required except for special symptoms; bromides occasionally, especially when insomnia is troublesome, and a purge now and then, almost complete the list.

A most important element in the treatment is that the physician should try to help the patient. In no part of his work can the family doctor do more for his patient than in these cases, and often because he knows his patient thoroughly and his patient trusts him. With one he must be firm, another he must humour, or banter; sometimes he must be harsh, at other times sympathetic, and at all times the line of treatment must be modified to meet the patient's circumstances. Unfortunately, often only the second and third best can be done; but if an ailing wife is made fit for her household duties, perhaps after a considerable interval and after many trials and tribulations, his credit will be all the greater, and he will deserve all he gets in the way of gratitude and remuneration.

SECTION XII.—GYNÆCOLOGICAL OPERATIONS

Medical Examination.—Before any woman is subjected to a gynæcological operation, it is very important to examine her heart and lungs, and to test her urine, especially for albumin and sugar. Certain diseases of the heart, lungs, and kidneys, may contra-indicate the performance of an operation altogether, or, at any rate, may necessitate its postponement—unless the proposed operation is of an urgent nature and has to be undertaken in an endeavour to save the life of the patient—until the diseased organ has been medically treated, and either a cure has resulted or the condition of the patient has so improved that the proposed operation becomes justifiable.

Pre-Operative Rest and Treatment.—Apart from urgent operations, the length of time the patient should be kept in bed prior to the operation depends partly on the nature of the operation, and partly on the state of health of the patient.

Nature of the Operation.—For an ordinary major gynæcological operation, such as the removal of an uncomplicated ovarian tumour or fibroid of the uterus, a pre-operative rest of twenty-four hours is sufficient. For all minor operations twelve to sixteen hours will suffice, except in the case of a perineorrhaphy, when forty-eight to seventy-two hours is better, as ample time is required to get the bowels properly regulated.

State of Health of the Patient.—Under certain conditions the length of time indicated will have to be extended. For instance, a patient with carcinoma of the cervix may be in such a miserable state of health from hæmorrhage, discharge, want of food, or neglect, that the chances of her surviving a radical operation will be greatly lessened unless she is kept in bed and efficiently treated for a week or fortnight before the operation is undertaken. Or, again, a woman with a fibroid of the uterus may be in such an anæmic con-

dition from prolonged hæmorrhage that the danger of removing her uterus may be greatly increased from the liability to syncope, pulmonary embolism, or femoral thrombosis.

Pre-operative preparation must, therefore, be modified to suit the condition of the patient and the nature of the operation intended. If the woman is ill-nourished or enfeebled by hæmorrhage or intoxication, special efforts are necessary to prepare her for what before her. She should be encouraged to take as much fluid as sible, and to diminish the risk of a post-operative acidosis; plenty of easily assimilated carbohydrate, which can be stored up for subsequent use, should be included in her diet. Extra sugar in her tea and coffee; jam, syrup, or honey liberally spread on her bread and butter; stewed fruits and sweet preserves given with rice pudding, and glucose in barley water or lemon drinks, are all helpful. Alkaline drinks, with sodium bicarbonate or citrate, also assist in counteracting the tendency to acetonæmia. Loss of fluid by strong purgation must also be avoided. If the bowels are regulated by gentle aperients, a simple enema or rectal wash out six hours before operation will suffice. Nervous and highly-strung women, and those to whom the thought of an operation is a source of dread and misgiving, often make a better recovery for a few days' preparatory rest-cure in bed, even if their general health is unimpaired. It is a great help to the operator for such patients to become used beforehand to their surroundings and to their nurses and those who will have to attend on them.

Pre-Operative Preparation — *Bowels.* — Twenty-four hours, if possible, before the operation an ounce of castor-oil should be given, and on the morning of the operation a soap-and-water enema should be administered. The enema should not be given within six hours of the operation, since in a few people it causes a good deal of distress, and even faintness.

Shaving.—On the evening before the operation the pubes and vulva should be shaved.

Bath.—After the patient has been shaved, she should have a warm bath. If, for any reason, she is unable to go to the bath-room herself, the nurse should carefully wash her in bed.

Douches.—In cases of vaginal sepsis, douches of biniodide of mercury (1 in 2,000) may be given the day before the operation, and one on the morning of the operation, after the enema has acted.

Antisepsis of the Operation Area.—Before an abdominal operation the antero-lateral surface of the patient from the level of the sternum down to 4 inches below the groins, and laterally to

the loins, should be painted with a solution of iodine (2 per cent.) in rectified spirit, and again just before the operation when the patient is under the anæsthetic.

For vulval and vaginal operations, after the patient is under the anæsthetic the surgeon applies the iodine solution on a swab to the vulva and through a speculum to the vagina. Care must be taken not to use a spray or such an excess of iodine that it runs over the perineum down to the buttocks, which will thereby be blistered by prolonged contact with the antiseptic.

Emptying the Bladder.—The urine must be drawn off by the catheter immediately before the patient is anæsthetized in the case of major operations. For minor operations it is sufficient for the patient to micturate naturally.

Anæsthesia and the Avoidance of Shock.—In general the choice of anæsthetics to be used at an operation must be left to the individual preference of the administrator. For most operations there can be no doubt that the ideal anæsthetic for women is nitrous oxide induction followed by ether. For short operations the ether may be given with a closed inhaler, but in major operations it is a great advantage to give the ether by the open method, after the patient is once anæsthetized. In cases in which prolonged anæsthesia is necessary, when there is likely to be post-operative shock, or when blood-loss may be expected, a combination of local infiltration anæsthesia and general anæsthetics has been found to be of the greatest benefit to both patient and surgeon. If at the same time saline solution is infused under the breast or into the axillæ during the whole operation, it can be claimed that shock is greatly diminished. The combination of anæsthetics advised is as follows: Half an hour before the operation starts, the patient is given a hypodermic injection of morphia (gr. $\frac{1}{6}$) and atropine (gr. $\frac{1}{100}$). Ether is given by the open method, and whilst quite lightly under its effect the saline apparatus with a two-way tube and two needles is started, the needles being pushed deeply under the skin, and the saline receptacle being hung up at least 5 feet above the patient. (About 2 pints of saline can be infused in an hour in this way.) Next, the skin to be incised is infiltrated with a 0·25 per cent. solution of novocain. The skin having been incised, the tissues beneath the linea alba are similarly infiltrated, and finally the subperitoneal tissues. After this the very smallest amount of open ether, which will keep the patient asleep, is all the general anæsthetic which is required. The advantages gained by this method are—absence of shock, retention of a good blood-pressure, and a much diminished amount of post-operative vomiting. The

amount of novocain solution used may be as much as 4 or 6 ounces without any danger of toxic symptoms.

Operative Preparation—*Position of the Patient.*—For abdominal operations the patient is placed in the Trendelenburg position, for vulval and vaginal operations in the lithotomy position.

It is important that the legs should be fixed at right angles to the thighs before the patient is tilted into the Trendelenburg position, as otherwise there is a danger of the legs being paralyzed from pressure.

The arms of the patient should also be carefully adjusted to her sides either by pins or towels, and best of all by a metal retaining

FIG. 204.—TRENDELENBURG POSITION: SIDE VIEW, SHOWING SCREEN, KNEE-TRAY, AND BODY SHEET.

instrument. If the arms hang over the edge of the table or are pulled up towards the head of the patient, pressure paralysis may result. If the table is fitted with shoulder-rests, many authorities consider it is better to have the legs extended on the thighs, the relaxation of the abdominal wall resulting therefrom being more marked.

Preparation of the Operation Area.—The iodine solution should again be applied to the surface already painted for abdominal operations. If the operation is vulval or vaginal in nature, a douche may be administered if there is any blood in the vagina, after which the operation area is to be painted with the iodine solution.

Aseptic Covering.—For abdominal operations the entire anterior surface of the patient should be covered with a sterilized sheet having a square hole cut in its centre to expose the operation area. For vulval and vaginal operations the legs of the patient should be encased in shaped sterilized bags, and the lower part of the abdomen and buttocks covered with a sterilized sheet with a square hole cut in such a position that the vulva is exposed (Figs. 204, 205, 206).

Surgeon, Assistants, and Nurses.—The surgeon, assistants, and nurses, should prepare their hands by a thorough cleansing with

FIG. 205.—TRENDELENBURG POSITION, VIEWED FROM THE CEPHALIC END OF THE PATIENT, SHOWING STERILIZED BODY SHEET WITH OPENING, TRAY FOR INSTRUMENTS FIXED OVER THE KNEES, TRAY FOR INSTRUMENTS AND SCREEN FIXED ACROSS CHEST IN FRONT OF PATIENT'S MOUTH.

soap and water, after which the hands should be rinsed and scrubbed in methylated spirit or a solution of biniodide of mercury (1 in 2,000). A sterilized overall, a sterilized mask, and india-rubber gloves which have been boiled for twenty minutes, should be worn, and

india-rubber boots or boot-overalls made of jaconet complete the preparation (Fig. 207).

Post-Operative Dressing.—After the abdominal wound is closed, the suture line should be painted with the iodine solution.

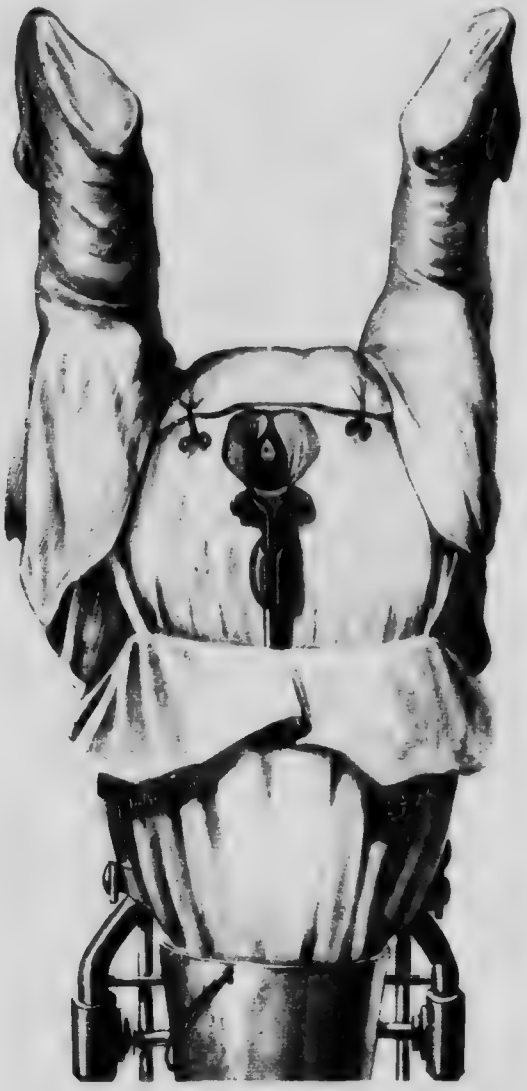

Fig. 206.—Lithotomy Position, showing Sterilized Leggings, Sterilized Perineal Cover, and Sterilized Towels in Tray.

Sterilized dressings, consisting of a piece of gauze, absorbent wool, and a many-tailed binder, are then applied or not according

to the practice of the surgeon. In the absence of dressings, a piece of lint is laid over the wound for the first few hours.

After an operation on the vulva or vagina a pad of gauze and a T-bandage are all that is necessary.

Fig. 207.—Surgeon clothed for Operating.

After minor operations on the uterus, a gauze pad or T-bandage is all that is required, except in rare cases when it may be necessary to plug that organ to arrest bleeding.

Post-Operative Treatment.—It is impossible to lay down hard-and-fast rules for the treatment of patients after operation. The following suggestions may be taken as a guide.

Recovery from the Anæsthetic.—The nurse must be in constant attendance upon the patient whilst she is recovering from the anæsthetic. It is a good plan to give saline solution *per rectum* as soon as the patient is back to bed and before she has recovered from the anæsthetic. If the patient vomits before regaining consciousness, care must be taken, by keeping the head on one side, to insure that none of the ejected fluid regurgitates into the trachea; and if the operation has been an abdominal one the nurse should relieve the strain on the incision by applying with her hands gentle pressure on each side of the abdomen.

Food.—Small sips of water may be given after six hours if the patient complains of thirst following an abdominal operation. After this the patient may have milk, milk and soda or lime water, tea or beef-tea, in increasing quantities according to her condition. A little bread and butter may be given on the third day, and on the fourth day; after the bowels have been opened, ordinary diet may be resumed.

After minor operations there is no need to prescribe such a strict diet, and the patient may be allowed the tea and beef-tea, etc., before the twelve hours if she wishes, and solid food may be given on the second day.

The quantity and variety of food to be given after an operation depend largely on the patient, and must be modified accordingly.

Micturition.—With certain exceptions, the patient should be encouraged to pass water naturally. If she is unable to do this, and twelve hours have elapsed since the operation, the catheter must be passed. After hysterectomy, and especially after the radical operation for carcinoma of the cervix, the catheter should be passed, even if the patient has micturated naturally, since a certain amount of residual urine is often present.

Defæcation.—On the third evening following the operation an aperient may be given, and on the fourth morning a soap-and-water enema.

Position in Bed.—The most generally comfortable posture and the best to insure drainage is that known as Fowler's position, in which the patient is propped up with pillows at her back, and a bolster under her thighs, which is fastened with bandages to the head-posts of the bed.

If drainage is of no account, the patient may be allowed to assume whatever position she finds most comfortable.

Sutures.—Metal clips should be removed on the fifth day, superficial sutures on the seventh day, while "through-and-through" sutures may be left for a day or two longer. Catgut sutures do not require removal.

Dressings.—After the clips or sutures are removed, the abdominal incision is covered with a piece of sterilized gauze, which is kept in position by strapping.

Gauze packing in the uterus, and tampons in the vagina, if used, should be taken out on the second day, and the patient may be douched with biniodide of mercury (1 in 4,000) twice daily when necessary. If this drug is irritating, saponated cresol can be substituted. After perineorrhaphy boric acid injections may be given twice a day, but many surgeons prefer to keep the operation area quite dry.

Getting up.—The patient may get up—After major operations on the seventeenth day; after plastic operations on the vagina on the twenty-first day; in other cases on the tenth day.

These times are necessarily only approximate, and assume that the convalescence has been uninterrupted. Each case, of course, must be judged on its own merits.

Post-Operative Complications.—Only the common complications following gynæcological operations will here be dealt with. For fuller information the student is referred to a textbook of gynæcological surgery.

Pain.—The pain following abdominal operations is worse the first night, and is felt in the back and abdomen. Pain in the back is best treated by placing an air cushion under the back and a pillow under the legs, which prevents the back becoming arched.

Abdominal pain is often relieved by adding 20 grains of acetylsalicylic acid in the "rectal saline." If this does not relieve the pain, an injection of morphia ($\frac{1}{6}$ grain) may be given, and repeated if necessary the first night. It is best to use as little morphia as possible, since it tends to encourage paresis of the bowels, and may also mask more serious symptoms.

Thirst.—Thirst can be relieved by rectal injections of normal saline solution. In addition the patient may be allowed to wash her mouth out with hot water as often as she likes. If, however, she is able to drink without vomiting, it will not be necessary to give much fluid *per rectum*.

Vomiting.—Vomiting following an operation is usually due to the irritation of the anæsthetic. It rarely lasts longer than twenty-four hours. It is often associated with flatulent distension. There is not any tenderness of the abdomen, rise of temperature or of pulse-rate.

A teaspoonful of bicarbonate of soda in half a tumblerful of warm water will often, by washing the stomach out, relieve the sickness. Gastric lavage is also a successful method of treating

some of these cases. At times a drop of the tincture of iodine in a teaspoonful of water, repeated half-hourly if necessary, is successful. If the vomiting does not cease with these simple methods, all food, liquid or solid, by the mouth should be stopped, and the patient put on rectal salines.

The vomiting due to intestinal distension may often be arrested by an enema.

The treatment of peritonitic vomiting and that due to intestinal obstruction is directed to the cause of this symptom.

Distension.—Flatulent distension is relieved by the passage of the long rectal tube, every few hours, if possible, for a distance of 18 inches.

The tube is left in for five to ten minutes. If this is not sufficient, the passage of flatus is often successfully accomplished by a rectal wash-out. To give a rectal wash-out, a solution containing 2 pints of soap and water and 1 ounce of turpentine well mixed is prepared. Ten ounces of this solution is then passed into the bowel by means of the rectal tube, to which the end of a glass funnel has been fixed. The funnel and tube are then raised and lowered several times, and finally the funnel is lowered into a basin of water and the soap and turpentine solution allowed to escape, with the consequent aspiration of flatus.

The tone of the bowel may also be raised with a hypodermic injection of eserine sulphate ($\frac{1}{100}$ grain) and strychnine sulphate ($\frac{1}{30}$ grain) every four hours, or pituitary extract (1 c.c.) every eight hours.

Shock.—Shock may be treated by the hypodermic injection of pituitary extract, by hot blankets or hot-water bottles (strictly protected), rectal salines (up to a pint, containing 1 ounce of brandy and 2 or 3 teaspoonfuls of glucose), continuous rectal, subcutaneous, or intravenous saline infusions.

Hæmorrhage.—Bleeding can only be arrested by pressure upon, or ligature of, the bleeding vessels at the site of the hæmorrhage.

Drainage-Tubes.—The drainage-tube should not be touched or irrigated for forty-eight hours. At the end of this time it can be removed altogether if it was left for the "oozing"; whilst if it was inserted because of sepsis it can be gradually shortened, and removed when the amount of fluid escaping is very small.

If suppuration occurs, it may have to be left in longer, and the wound may have to be irrigated.

Management of Convalescence.—No hard-and-fast rules can be laid down for the management of the patient after operation. They must be modified to meet the general condition and temperament

of the patient, the nature of the operation, and the amount of shock, or the complications which accompany or follow it, and the patient's powers of recovery. After ovariotomy for a simple cyst which had caused no symptoms beyond the abdominal enlargement and discomfort, convalescence may be as straightforward as after a normal labour and require no special management. On the other hand, the recovery after hysterectomy for malignant disease, in a woman anæmic from repeated hæmorrhages and poisoned by absorption, may call for constant care and watchfulness on the part of the attendant. In the former case with no post-operative complications, the patient may be able to read or sew the day after operation, to take an ordinary light diet, and sit up in bed a day or so later, and get up in ten days or a fortnight. In the latter the recumbent position may be necessary for a week or more with a fluid diet, strict isolation from relatives and friends, no letters or books for another week, and rest in bed for full three weeks or more.

For the heavy lethargic type of women with a tendency to obesity, massage, bed exercises, and as early rising as healing will permit, would be advantageous; for the thin spare restless type of women, a longer rest in bed and slower convalescence would be beneficial. Some suggestions as to the management of neurasthenic patients have already been given, and there is no need here to go further into detail. Enough indication has been given to show that all women cannot be treated alike even after the same operation, but that every effort must be made by the attendant to adapt her management to the individual patient and by a careful study of the requirements of each case to make the convalescence as easy, as little irksome and as helpful towards complete and rapid restoration to full duty as circumstances permit.

In the description of the following operations, the preparation of the patient, and the after-treatment, etc., will not be described, as these subjects have already been dealt with on pp. 559 to 567.

The Abdominal Incision.—The abdomen is generally opened by a vertical incision, either median (that is, through the linea alba) or extra-median (that is, through the fibres of the rectus muscle). The majority of operators choose the median incision, contending that the edges of the wound can be better retracted, whilst the risk of hæmatoma afterwards is not so great, fewer vessels being incised. Those surgeons who use the extra-median incision insist that the risk of ventral hernia is thereby diminished.

Occasionally the abdomen is opened by horizontal incisions through the skin, and vertical incisions between the recti and through the peritoneum. It is claimed, by those who use this

method, that it gives greater accessibility to the subjacent organs and lessens the risk of ventral hernia. Whilst it certainly increases the chance of a hæmatoma, this incision has cosmetic advantages, inasmuch as, if the skin incision is made below the level of the pubic hairs, the resulting scar will be covered with their regrowth.

The Abdominal Sutures.—There are almost as many ways of closing the abdomen as there are of evading the law. Nowadays the abdomen is closed by most surgeons in three separate layers—the peritoneum, the aponeurosis, and the skin. The material composing the sutures varies somewhat with individual surgeons; thus, some use catgut for all three layers, some catgut for the peritoneum, silk for the aponeurosis, and catgut or silkworm-gut for the skin. Catgut has the advantage that it is absorbed in healthy tissue, whilst silk, unless of the very finest size, is not, and is therefore more likely to be infected. It is inadvisable to bury silk sutures in septic cases, and in such some surgeons are satisfied with a single layer of silkworm-gut through-and-through sutures which can be removed at a suitable time. The risk, however, of a subsequent ventral hernia is much greater in the case of the one-layer method than of the three-layer method. The disadvantage of catgut is that it sometimes gets absorbed too quickly, with the result that the whole wound breaks down. The use of metal clips for the skin incision diminishes the risk of skin infection, but they are rather more painful to remove than sutures.

OPERATIONS.

DILATATION OF THE CERVIX UTERI.

Dilatation of the cervix is a necessary preliminary to any intra-uterine examination or operation by the vaginal route; thus, curettage, removal of uterine polypi, enucleation of a submucous fibroid, removal of tissue for microscopical examination, generally necessitate dilatation of the cervix. This operation is also performed in certain cases of dysmenorrhœa and sterility.

Method.—A bimanual examination of the pelvis is made to ascertain the position of the uterus and the condition of its appendages.

A self-retaining speculum, if the patient is not a virgin, in which case Sims' speculum is to be preferred, is inserted. The cervix is steadied with the volsellum forceps, and the uterine sound is passed into the uterus to confirm its position and to ascertain its length. Metal or other dilators are now carefully and gradually passed into

the uterus until the requisite amount of dilatation is reached, care being taken that they pass into the canal without touching anything *en route*.

Precautions.—The operator must not use undue force, must hold the dilator in the way illustrated in Fig. 208, and must insure that each dilator is entering the same distance and in the same direction as its predecessor. Neglect to take these precautions may easily result in the cervix being badly torn or the uterus perforated.

Perforation of the uterus usually occurs at the sides or in front, when the dilator enters the broad ligament or utero-vesical cellular

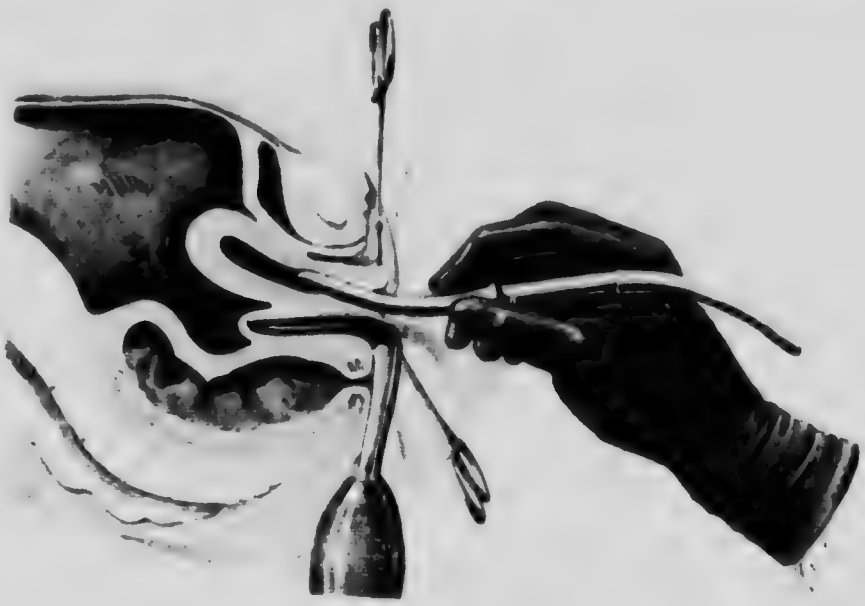

Fig. 208. Curetting the Uterus. Passing the Dilator.

tissue, and the peritoneal cavity is not opened. If the uterus is perforated, further operative proceedings should be stopped. On no account should an intra-uterine douche be given. In most cases, if the operation has been conducted with the proper aseptic and antiseptic precautions, no harm results if the uterus is perforated. Occasionally the wound bleeds, forming a pelvic hæmatocele or broad ligament hæmatoma.

If the uterus is septic, local or general peritonitis may result, and must be treated accordingly.

CURETTING THE UTERUS.

The mucous membrane of the uterus may be scraped away with the curette in cases of chronic endometritis associated with overgrowth of the mucous membrane, or with retained products of conception. Curetting is also practised for membranous dysmenorrhœa, and to obtain a specimen of the mucous membrane for microscopical examination.

Method.—The cervix having been dilated, the flushing curette is next passed into the uterus up to the fundus, and then drawn from above downwards over the internal surface of the uterus.

Fig. 209.—Curetting the Uterus: Using the Flushing Curette.

The curetting should be carried out in a routine manner, first the anterior surface being scraped, then the posterior, and lastly the lateral surfaces, particular care being taken to curette thoroughly the fundus and cornua of the uterus. If there is an erosion of the cervix present, this should be scraped with a sharp spoon (Fig. 209).

Undue hæmorrhage after a curetting can be stopped by plugging the uterus with gauze.

Precautions.—Unless due care is used the uterus may be perforated, and if the solution used with the flushing curette contains, as it may do, some chemical such as biniodide of mercury 1 in 4,000

or saponated cresol 1 in 360, the result may be very serious, or even disastrous.

Septic infection, both local and general, may follow on a curetting if the proper precautions are not taken, or if any portion of the genital organs is septic.

The leucorrhœa unassociated with menorrhagia and that due to cervical catarrh cannot be cured by curettage.

REMOVAL OF UTERINE POLYPI.

Mucous Polypus of the Cervix. A mucous polypus of the cervix is easily removed by twisting it off with ring forceps, and if the site of detachment bleeds severely, which is very unusual, it can be cauterized or the cervix and vagina plugged. The cervix should in addition be well curetted. In most cases the presence of a mucous polypus of the cervix is an indication that the endometrium lining the body of the uterus is unhealthy: if, then, the patient complains of menorrhagia or metrorrhagia, the body of the uterus should be curetted also.

Mucous Polypus of the Body.—The cervix having been dilated, the polypus (or polypi, as there are sometimes more than one), if it can be found, is twisted off and the uterus afterwards curetted.

Fibroid Polypus of the Cervix.—If the fibroid polypus is small, it can be grasped with ring forceps and twisted off. If the pedicle is too thick for this method of removal, it should be severed with scissors. There will not be any hæmorrhage, the muscle contracting on the vessels. If the polypus is so large that its pedicle cannot be reached, the capsule of the tumour should be incised and reflected, after which the tumour can be removed piecemeal or by twisting. The capsule is then twisted and severed.

Fibroid Polypus of the Body.—If the polypus has been expelled from the body of the uterus, and its pedicle is hanging through the cervical canal, the tumour is removed in the manner already described. If the polypus is only disclosed after the cervix has been dilated, its removal is also accomplished by the methods mentioned. The uterus should be curetted afterwards. In some cases the fibroid polypus is only partly extruded through the cervical canal. In this case it is most important to be sure that the tumour is a polypus, and not the inverted uterus. The presence of a polypus having been diagnosed, a volsellum forceps is fastened to the tumour, which is then drawn down. If the pedicle can now be reached, it is severed in the manner described. If the pedicle cannot be reached,

the capsule of the tumour is incised, and the tumour is then removed by morcellement.

Placental Polypus.—A placental polypus may be removed in the manner already described for a mucous polypus; but it may have to be curetted away, and there is very often extremely sharp bleeding during the process.

ENUCLEATION OF A SUBMUCOUS FIBROID.

The cervix having been dilated, the mucous membrane and capsule must be incised, the scissors being guided by the index finger of the left hand. The finger is then passed through the hole that has been made in the capsule, and the tumour is separated from its capsule, after which it is seized with volsellum forceps and extracted. If the tumour is too large to be delivered through the cervical canal, the cervix must be incised up to the internal os, the bladder being reflected, if necessary, for this purpose. If the tumour is even then too large, it must be cut up and removed in pieces.

Precautions.—It is no use endeavouring to enucleate a submucous fibroid unless it is definitely bulging into the cavity of the uterus. This is only to be discovered by dilating the cervix and exploring the uterus with the finger. If the whole of the tumour is not enucleated, serious hæmorrhage or sepsis may result. To decide whether enucleation or hysterectomy would be the better treatment requires judgment. Enucleation is a much slighter operation, though not one to be lightly undertaken by those without experience of intra-uterine manipulation. It may sometimes be preferable even in the case of multiple tumours, as one submucous growth may be the sole cause of the hæmorrhage; for instance in a patient who is strongly averse from removal of the uterus or whose general condition makes an abdominal operation undesirable.

TRACHELORRHAPHY.

This operation consists in repairing a torn cervix. If the laceration is associated with any marked hypertrophy of the vaginal cervix, trachelorrhaphy is not indicated. It is better in such circumstances to amputate the cervix.

Method.—A self-retaining speculum having been inserted into the vagina, the cervix is pulled down by means of volsella attached to its anterior and posterior lip. The cervix is then dilated, and its lining and that of the uterus curetted if necessary. The lacera-

tion is now increased by a small incision in its receding angle, after which as much mucous membrane as the operator deems advisable is excised from each side of the split cervix, a piece of mucous membrane being left on the inner edge to form the lining of the new cervical canal. The raw areas are now approximated by inserting as many sutures as necessary in the following way: The needle is made to transfix the anterior lip at its outer edge, and is carried

FIG. 210.—TRACHELORRHAPHY, DOTTED LINE SHOWING INCISION DEEPENING LACERATION.

deep to the raw surface, emerging at the outer edge of the piece of mucous membrane that has been left. It is then again introduced into the posterior lip at the outer edge of the strip of mucous membrane, and guided deep to the raw surface until it emerges at the outer edge of the posterior lip. When the suture is tied the raw surfaces are approximated. If the laceration is bilateral, sutures are inserted in a similar manner on the opposite side (Figs. 210, 211, 212, 213, 214).

Fig. 211.

Fig. 212.

FIG. 211.—TRACHELORRHAPHY.
Limits of mucous membrane to be excised, mapped out.

FIG. 212.—TRACHELORRHAPHY.
Mucous membrane removed.

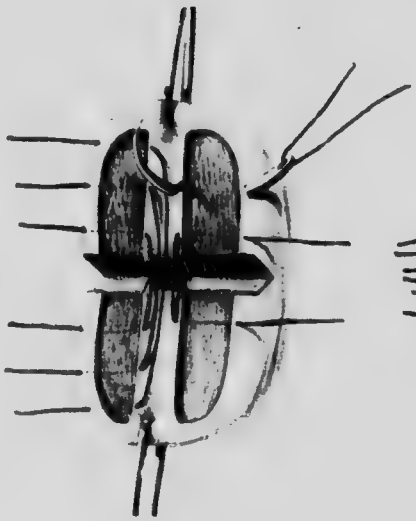

Fig. 213.

Fig. 214.

FIG. 213. TRACHELORRHAPHY.
Method of applying the sutures.

FIG. 214.—TRACHELORRHAPHY.
Sutures applied and tied.

Precautions.—The operator must be careful to remove sufficient mucous membrane in the receding angle, otherwise the union will be faulty.

AMPUTATION OF THE CERVIX.

Amputation of the cervix is indicated in certain cases of congenital hypertrophy of the cervix, in hypertrophy due to prolapse, when a laceration is too extensive for trachelorrhaphy, and in severe cases of erosion of the cervix associated with marked leucorrhœa.

Method.—A self-retaining speculum having been inserted into the vagina, the cervix is drawn down as far as possible with vol-

Fig. 215.—Amputating the Diseased Cervix.

sellum forceps. The cervical canal is then somewhat dilated in order that the sutures may be more accurately inserted. The limits of the bladder having been ascertained by means of a sound, anterior and posterior flaps are then made at the desired level

FIG. 216. SUTURES ON ANTERIOR AND POSTERIOR SLIPS SECURED, READY TO TIE. LATERAL SUTURES, FOR CONTROLLING HÆMORRHAGE, IN POSITION.

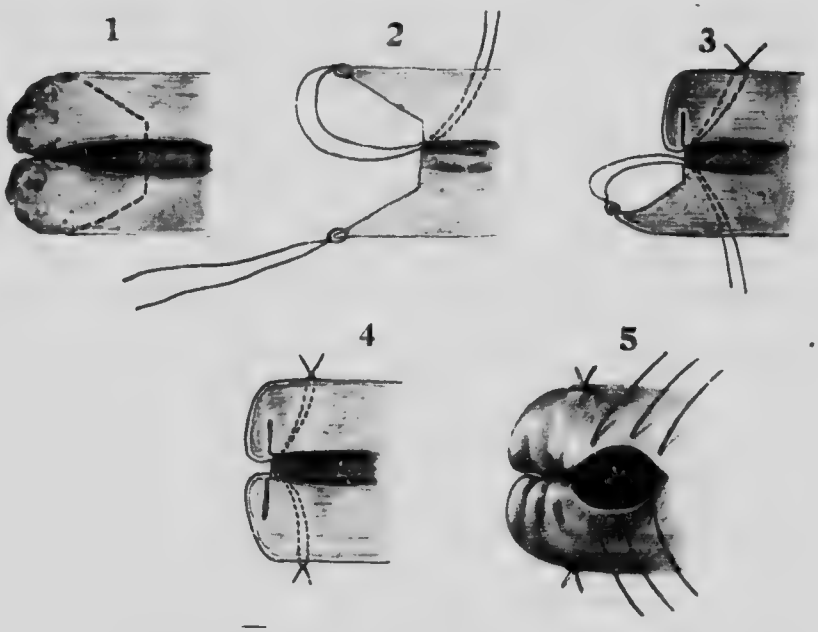

FIG. 217.—SHOWING THE DIFFERENT STAGES IN AMPUTATION OF THE CERVIX, WITH THE SUTURES APPLIED, AND TIED.

through the mucous membrane covering the cervix, and are then reflected upwards. The cervix is next amputated (Fig. 215).

A chromicized catgut ligature is now made to transfix the middle of the free edge of the anterior flap, and is tied, leaving two long ends. One end of the ligature is attached to a needle, which is then passed into the cervical canal and out through the base of the anterior flaps to one side of the middle line. The same proce-

FIG. 218.—ANTERIOR COLPORRHAPHY.
Separating anterior vaginal wall from the cervix and bladder.

dure is followed with the other end of the ligature, which is brought out a quarter of an inch to the other side of the middle line. There still remain on each side of the cervix the cut edges, and these are united with one or more catgut sutures and all bleeding is arrested. The ligature attached to the anterior flap is now tied, with the result that the anterior flap is made to cover the front part of the

cervical stump. By a similar procedure the posterior raw surface of the stump is likewise covered, and so all oozing in this situation is arrested (Figs. 216, 217).

Precautions.—If the cervix is amputated high up, the operator must be careful, in reflecting the vaginal mucous membrane, not to

FIG. 219.—ANTERIOR COLPORRHAPHY.

Anterior vaginal wall retracted; bladder pushed up; purse-string suture applied to fascia below the bladder.

injure the bladder. In such circumstances, also, the uterine artery or one of its branches may be divided, and must be secured with a separate ligature, in which case great care must be taken not to include the ureter in the ligature.

ANTERIOR COLPORRHAPHY.

There are many ways of performing this operation. A usual method consists in removing a portion of mucous membrane from the anterior vaginal wall, pushing up the bladder, keeping it in its new position by a circular suture, and uniting paravaginal tissue and

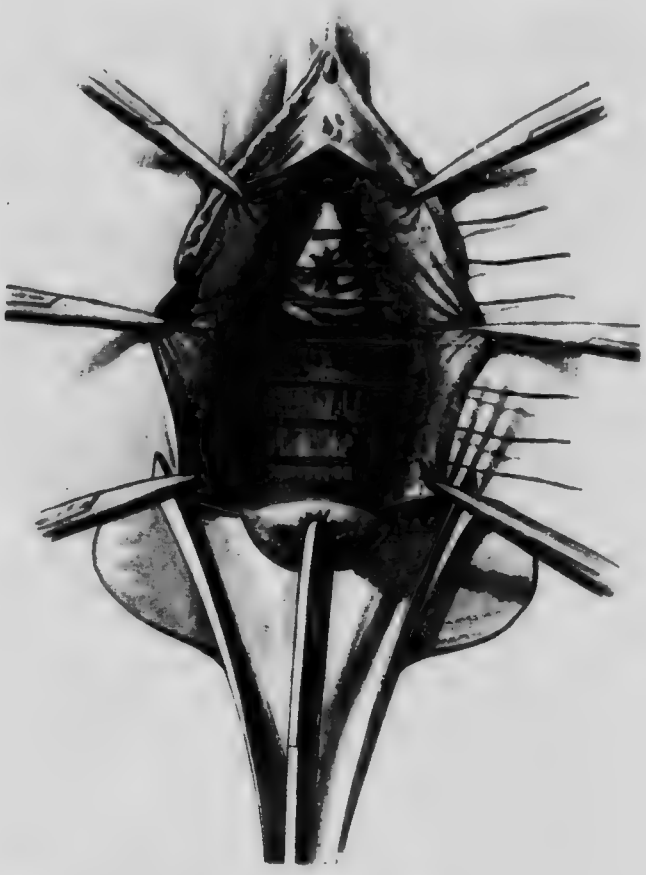

FIG. 220.—ANTERIOR COLPORRHAPHY.

Bladder pushed back with purse-string suture; mattress sutures passed through reflected vagina. Portion of vaginal wall external to dotted line is removed with scissors.

the cut edges of the mucous membrane below it. The operation is performed for cystocele either in connection with prolapse of the uterus or apart from it.

Method.—A self-retaining speculum having been inserted into the vagina, the cervix is pulled down with a volsellum, and the

anterior vaginal wall put upon the stretch. The lower limit of the bladder having been ascertained with the sound, a small transverse incision is made well below this limit through the mucous membrane into the connective tissue. A blunt-pointed pair of scissors is then inserted through this incision, and the scissors are pushed up in the

FIG. 221.—ANTERIOR COLPORRHAPHY.

The cervix is drawn down to show the sutures in position. If the operation is properly completed, the cervix will be tucked back so that it cannot be drawn to the outlet, as shown.

plane of connective tissue between the bladder and the anterior vaginal wall till its points reach half an inch below the level of the urethral orifice. The scissors are now opened a little and then withdrawn. The separated mucous membrane along its whole length is now divided in the middle line with the scissors.

Two or three pairs of pressure forceps are then affixed to the cut edges of the mucous membrane to retract it, and by means of the fingers and scissors the bladder is bared and pushed up out of the way. No attention need be paid to the slight oozing that results, but if any large veins or arterioles are injured they should be separately ligatured. A purse-string catgut suture is now inserted

FIG. 222.—POSTERIOR COLPORRHAPHY.

Flap of posterior vaginal wall dissected up; Levator ani and rectum exposed. Dotted line shows amount of vaginal wall to be excised.

into the paravaginal tissues, so that when it is tied the bladder is kept up. The paravaginal tissue is then approximated in front of the cervix below the bladder, after which the separated edges of mucous membrane are sutured (Figs. 218, 219, 220, 221).

Precautions.—The operator must be careful not to injure the bladder during its separation, and to stop all bleeding more than capillary oozing. If the suture sequestrating the bladder is put in too deeply and too widely there is a risk of occluding a ureter.

Fig. 223.—Levatores Ani sutured in front of Rectum

POSTERIOR COLPORRHAPHY.

This operation consists in removing a portion of the posterior vaginal wall for the cure of a rectocele, but, as it is practically always combined with a perineorrhaphy, it will be described under this operation.

COLPO-PERINEORRHAPHY.

This operation is undertaken for the repair of the perineum in cases of prolapse and for rectocele.

Method.—A pair of pressure forceps is fixed on each side of the vulva at the lower limit of the labium minus. When these are retracted by the assistant, the edge of the torn perineum is put upon the stretch.

The edge of the perineum from the point of one forceps to that of the other is now cut away with scissors. The cut edge of mucous

Fig. 224.—Perineorrhaphy: Application of Superficial Sutures.

membrane is next secured with a pair of pressure forceps, and by the aid of the scissors it is dissected up for about half an inch till the plane of cellular tissue between the rectum and the posterior vaginal wall is struck. By means of a swab the mucous membrane is then separated as high as is deemed necessary. When this limit has been reached, a pair of pressure forceps is attached in the middle

line to the mucous membrane at the upper limit of its separation, after which the flap of separated mucous membrane is cut away with scissors, the incision on each side reaching from the point of the lateral forceps to that of the median pair (Fig. 222).

A certain amount of oozing will result. If this is slight, it will be controlled when the approximating sutures are in position. If it is free, the bleeding-points must be separately and securely ligatured.

FIG. 225.—COMPLETE RUPTURE OF THE PERINEUM.
Dotted lines show extent of mucous membrane to be removed.

The cut edges of vaginal mucous membrane are now approximated with a continuous catgut suture commencing in the middle line at the point where the median forceps was attached (Fig. 223).

This approximation is at first only carried a certain distance, to allow of the deeper sutures being inserted. The levator ani of one side is now firmly sutured to its fellow of the opposite side by two or more catgut sutures, so that the rectum is occluded from view.

A second line of sutures is now inserted to bring the fascia together in front of the levatores ani, after which the suture of the mucous membrane is completed (Fig. 223).

Finally the cut edges of the skin are united (Fig. 224).

Precautions.—The operator must be careful not to wound the rectum, and to stop hæmorrhage of any severity, as if oozing persists a hæmatoma may result, invalidating the operation, and, very rarely, putting the life of the patient in danger.

Fig. 226.—Complete Rupture of the Perineum: Suturing of the Divided Sphincter Ani.

OPERATION FOR COMPLETE LACERATION OF THE PERINEUM.

The operation for complete rupture of the perineum is similar to that described for incomplete rupture, but in addition the torn rectum must be repaired, and this is done in the following way:

Method.—Each lateral forceps is fixed at the position already indicated, and a strip of tissue, including the edge of the recto-vaginal septum, is removed with scissors from the point of one forceps to that of the other (Fig. 225).

The mucous membrane of the posterior vaginal wall having been reflected upwards some little way, the sides of the rectum are

Fig. 227.—Complete Rupture of the Perineum: Levatores Ani united.

separated with the scissors, by an incision on each side, from the external limits of the recto-vaginal septum posteriorly for about half an inch on each side of the anus external to the lacerated sphincter. A pair of pressure forceps is now fixed to the outer ends of the lacerated sphincter muscle. The edges of the laceration in the anterior rectal wall having been cut away with scissors, the forceps fixed to its outer edges are approximated, and the edges are then united with interrupted catgut sutures, with the result that the lumen of the rectum is restored. A special stitch at the

anus should approximate the torn sphincter. The rest of the operation is performed in the manner described for colpo-perineorrhaphy (Figs. 226, 227).

Fig. 228. Fig. 229.

FIG. 228.—REMOVAL OF BARTHOLIN'S CYST.
Cyst being enucleated with the help of the handle of a scalpel.

FIG. 229.—REMOVAL OF BARTHOLIN'S CYST.
Bed of cyst obliterated by catgut sutures.

Precautions.—To be successful, this operation must be conducted with very strict aseptic precautions, and all serious oozing must be arrested.

REMOVAL OF BARTHOLIN'S CYST.

Method.—An incision is made through the skin in the long axis of the cyst, at the junction of the skin and mucous membrane. The cut edges being retracted with pressure forceps, the cyst wall is separated with the handle of the scalpel and finger from the adjacent connective tissue. The cavity resulting is obliterated with catgut sutures, after which the cut edges of skin and mucous membrane are united with a continuous catgut suture (Figs. 228, 229).

Precautions.—The cyst wall should not be injured, if possible, as it is much easier to remove the cyst if it remains whole. All bleeding should be arrested, especially that from some branches of the pudic vessels in relation with the upper part of the cyst.

REMOVAL OF A VAGINAL CYST.

A vaginal cyst is removed in a similar way to that just described.

Precautions.—Unless care be taken, the bladder or rectum may be injured during the removal of the cyst; and if the latter is large and situated in the anterior vaginal wall, the ureters may be injured.

REMOVAL OF A URETHRAL CARUNCLE.

Method.—The urethral canal is dilated a little. The caruncle is then seized with a pair of pressure forceps and removed with scissors. Lastly the raw base is cauterized with the actual cautery, a small metal dilator being inserted into the urethral canal and held against the anterior wall of the urethra to prevent it being burnt, thus obviating the danger of a stricture.

An alternative method of removing a urethral caruncle is to excise it with a scalpel, and afterwards to approximate the edges of the mucous membrane with fine catgut sutures, which should include a little of the raw subjacent tissue, so as to arrest the hæmorrhage.

PROLAPSE OF THE URETHRAL MUCOUS MEMBRANE.

Method.—The prolapsed mucous membrane having been put on the stretch by the dissecting forceps, the mucous membrane is transfixed with a catgut suture, traversing the urethral canal as it does so (Fig. 230). That portion of the mucous membrane anterior to the suture is then cut off with scissors, and that portion of the suture which can be seen traversing the urethral canal is pulled

down and divided, so that there are now two sutures. With these two sutures the right and left sides of the cut mucous membrane can be approximated (Fig. 231).

Fig. 230. Fig. 232.

Fig 231.

Fig. 230.—Prolapsed Urethra transfixed with Catgut Suture.
Fig. 231.—Excision of the Prolapsed Urethra.
Fig. 232.—Completion of Suture.

Lastly, the cut edge of the mucous membrane is sutured to the urethral orifice, with as many interrupted sutures as may be necessary (Fig. 232).

Precautions.—Care must be taken not to incise the vestibule but only the urethral mucous membrane adjacent to it, otherwise there is danger of a stricture resulting.

EXCISION OF THE VULVA.

The vulva is removed, either in part or whole, for carcinoma, sarcoma, leukoplakic vulvitis, and hypertrophy of the labia.

FIG. 233.
Dotted lines show limit of tissues to be excised.

Method.—Taking total excision of the vulva as the example of this operation, it is performed as follows:

The area to be removed is included within an outer and inner incision. The outer incision, which should be made well clear of the disease and includes the skin and subcutaneous tissue down to the deep fascia, starts above the clitoris, surrounds the labia, and

ends in front of the anus. The inner incision commences above the meatus urinarius, and is continued round the vaginal orifice (Fig. 233).

The tissues between these two incisions are then dissected away as a whole down to the deep fascia, and all bleeding parts are ligatured with catgut (Fig. 234).

Fig. 234.—Excision of the Vulva for Epithelioma: Removal of Diseased Tissue between the Lines of Incision.

The cut edges above the urethral orifice are now united by interrupted catgut sutures, and below the urethral orifice the wound is sutured by approximating the cut edge of the skin to that of the vaginal wall (Fig. 235).

If the tension on the catgut stitches is great, a few silkworm-gut sutures can be inserted in addition.

In cases of carcinoma, the inguinal glands on both sides should be removed at the time or subsequently.

OPERATION FOR DYSPAREUNIA.

Method.—The mucous membrane of the posterior vaginal wall is dissected up, the curved line of incision being shown in Fig. 236, and the dissected flaps being shown in Fig. 237.

Fig. 235.—Operation for Dyspareunia: Suturing Mucous Membrane over the Raw Surface.

The perineum is then divided nearly to the anus, the vertical line of incision being shown in Fig. 236, and the division being made being shown in Fig. 237.

The gaping wound is more or less diamond-shaped.

Any bleeding is arrested by a few interrupted catgut sutures inserted so that the approximated raw surfaces are more or less horizontal.

Catgut sutures are lastly inserted so that the cut edge of the dissected flap of mucous membrane is sutured to the cut skin-edge, the raw surface being thus completely covered (Fig. 238).

HYSTERECTOMY.

The uterus may require removal because it is the seat of a growth; for bleeding associated with chronic metritis (fibrosis); in certain cases of tubal disease, such as extra-uterine pregnancy, sepsis, tubercle, and cancer; to render the removal of an ovarian or broad ligament cyst safer; because it has been injured during labour

Fig. 236.—Operation for Dyspareunia, showing Lines of Incision.

or an operation; for inversion or hæmatometra; in certain rare cases of dysmenorrhœa; and when the seat of acute sepsis, tuberculous endometritis, or interstitial pregnancy. The body of the uterus may be removed, through an abdominal incision, at the level of the internal os by the operation of subtotal hysterectomy, or the whole uterus may be removed by the abdominal or vaginal route by the operation of total abdominal or vaginal hysterectomy as the case may be.

SUBTOTAL HYSTERECTOMY.

Method.—The peritoneal cavity having been opened, the condition of the Fallopian tubes and ovaries is noted and the tumour is drawn up through the abdominal incision. The ovario-pelvic ligament of one side is clamped with two pairs of pressure forceps. If the patient is under fifty years of age and the ovaries are healthy,

FIG. 237.—OPERATION FOR DYSPAREUNIA: REFLECTION OF MUCOUS MEMBRANE—INCISION OF PERINEUM.

they should be left, in which case the forceps should clamp the meso-salpinx between the ovary and the uterus instead of the ovario-pelvic ligament.

The tissues between the forceps are then divided with scissors. The round ligament is next clamped and divided, and the same procedure is then followed on the opposite side. The peritoneum in

front of the uterus is then incised by a transverse incision uniting the round ligaments. This incision should be made just where the peritoneum becomes loosely attached to the uterus, above the level of the bladder. The peritoneum is then reflected downwards and the bladder with it.

The uterine vessels are now secured at each side of the cervix with pressure forceps, and a suture is passed round them so that a

Fig. 238.—Excision of the Vulva for Epithelioma: Wound closed with Interrupted Sutures.

portion of the cervical tissue is included in the suture, and as a further precaution the cut ends of the uterine vessels can in addition be ligatured.

The uterus is now removed at the level of the internal os.

The uterine and ovarian vessels in the clamps are next ligatured, and if they are properly secured the stump of the cervix should be dry. If there is any oozing it can be controlled by one

or more mattress sutures of catgut. The divided peritoneum of the broad ligaments and uterus is then united with a continuous catgut suture, care being taken to bury the ovarian and round ligament stumps. The peritoneal cavity having been carefully freed of all blood and blood-clots, the abdominal incision is closed.

ABDOMINAL TOTAL HYSTERECTOMY.

Method.—In this operation the steps, up to the point where the uterine vessels are clamped and divided, are the same as those already described for subtotal hysterectomy. The further steps are as follow:

The bladder is detached partly by scissor-dissection and partly by swab-pressure until the front wall of the vagina is reached. Exactly how much of the anterior vaginal wall has to be exposed must depend upon the size of the cervix.

When the lower limit of the vaginal cervix is reached, the anterior vaginal wall is incised and the vagina opened. A volsellum is then fastened to the cervix, which is pulled upwards, and the uterus severed from its vaginal attachments, care being taken to divide the vagina as close to the cervix as possible.

The divided vagina is then seized with ring forceps, and catgut sutures are applied at its lateral angles to arrest the oozing that always occurs at these parts.

The uterine and ovarian vessels and the round ligaments are then secured with sutures, after which the cut edges of the broad ligaments, together with the peritoneum reflected from the front of the uterus and the posterior vaginal wall, are united with a continuous catgut suture as before. Some surgeons close the vaginal opening in addition.

RADICAL ABDOMINAL HYSTERECTOMY FOR CARCINOMA OF THE CERVIX.

This operation aims at removing the uterus and its appendages, together with as much cellular tissue of the pelvis as possible, and sufficient vagina to form a bag in which the malignant cervix can be enclosed.

By this operation the risk of local implantation of cancer cells (a frequent cause of recurrence when the old method of vaginal hysterectomy was employed) is avoided: malignant glands can be removed, together with any para-metric or para-vaginal tissue

which is the seat of malignant infiltration. This operation is one of great severity and difficulty, and requires a high degree of surgical skill. It will only be necessary here to outline its main features.

Method. The abdominal cavity having been opened, a very careful examination of the uterus must be made in order to decide whether the operation is feasible.

The operation is contra-indicated if the bladder or rectum is infiltrated with the growth, and if the iliac glands are enlarged and fixed.

The mere fact that the glands are enlarged or that the cellular tissue of the broad ligament is hard does not necessarily contra-indicate the operation, as this condition may be due only to inflammation, or even if due to malignant infiltration the tissues may not be fixed.

The ovarian vessels are first secured by passing a suture under them at the level of the pelvic brim. The round ligaments are then ligatured, after which the broad ligaments and Fallopian tubes at the side of the uterus are clamped and the broad ligaments divided. A ligature is then passed round the Fallopian tubes and the divided broad and round ligaments at their uterine attachments. This ligature arrests the bleeding from the uterine ends of the ovarian vessels. The peritoneum in front of the uterus is next transversely incised and the bladder reflected.

The uterine vessels outside the point where they cross the ureter are identified, clamped, divided, and ligatured, and the ureters are then displayed, isolated, and traced to their entry into the bladder.

The peritoneum at the bottom of the pouch of Douglas is next seized with forceps, incised, and the rectum separated from the posterior vaginal wall.

The utero-sacral ligaments are then clamped on each side and divided, after which the lateral cervical ligaments are similarly treated.

The uterus is then quite free except for its vaginal attachment.

An appropriate clamp is now adjusted so that the blades meet well below the diseased cervix, and after being tightened the vagina below the level of the clamp is divided and the uterus removed with the diseased cervix enclosed in the bag of vagina.

The cut edges of the vagina may now be stitched to prevent oozing, the divided masses of cellular tissue are securely ligatured, and the clamps removed.

The cellular tissue covering the external iliac artery and vein, on

each side, is next very carefully stripped off and removed, together with the obliterated hypogastric artery and the cellular tissue of the obturator fossa. In addition, any iliac glands or glands in the obturator fossa should be removed. If possible, this mass of cellular tissue should be separated in one sheet (the obturator nerve being isolated). This sheet of cellular tissue is now clamped at the cornu of the bladder and close to the anterior division of the internal iliac artery, divided, and removed. A ligature is then applied round each pair of forceps, special care being taken to secure the anterior branch of the internal iliac artery.

The floor of the pelvis is then covered in by uniting the peritoneum of the broad ligaments, bladder, and rectum, with a continuous catgut suture. Two pints of saline solution may be poured into the peritoneal cavity before the abdomen is closed, if during the operation continuous saline has not been administered.

VAGINAL HYSTERECTOMY.

The operation of vaginal hysterectomy is not so frequently employed as it used to be. As a means of removing the uterus for carcinoma of the cervix it has practically been given up, because it is impossible to make such a wide sweep of the cellular tissue and glands, the extent of the disease cannot be accurately determined, and the danger of cancer implantation on the cut surfaces of the vagina is a very real one. In fact, a large number of the recurrences after removal of the uterus by the vaginal route have been in the vault of the vagina. In non-malignant cases, supposing the uterus is not large, vaginal hysterectomy has certain advantages in that the shock is less, so that in elderly and feeble women it is safer. In very fat women it may also be an easier and safer operation, as it may also be in cases of pyometra.

Method.—A self-retaining speculum having been inserted into the vagina, the cervix is pulled down with volsellum forceps, or, better still, with strong silk which has been made to transfix it. The lower limit of the bladder having been ascertained by the sound, the mucous membrane is incised transversely well below this limit. The bladder is next separated up to its peritoneal reflection by means of the finger pushed into the cellular tissue between the bladder and the cervix, if necessary using the scissors also for this purpose. This separation is carried out widely on each side, so as to push the ureters to one side.

The peritoneal reflection from the uterus on to the bladder is now seized with a pair of pressure forceps, pulled down and cut,

and thus the utero-vesical pouch is opened. The cervix is then drawn well forwards, and the mucous membrane of the vagina is transversely divided at the level of the posterior vaginal fornix. The mucous membrane is then reflected in a similar way to that already described until the peritoneum at the bottom of the pouch of Douglas is reached, when this is cut through and the fingers can be passed into the utero-rectal pouch.

The anterior and posterior incisions in the mucous membrane are now united by dividing the small portions of this membrane which are still uncut in the lateral fornices.

A swab to which a silk ligature has been tied is next inserted into the pouch of Douglas to keep the intestines back. The assistant now pulls the uterus to one side, and the operator passes his index finger into the utero-rectal pouch and grasps the lower part of the broad ligament between his finger and thumb and feels for the uterine artery.

When the artery has been identified, the operator transfixes that portion of the broad ligament which he is grasping above the level of the uterine vessels with an aneurism needle. A ligature is then attached to the needle, the instrument withdrawn, and the ligature tied. In this way the uterine vessels are secured, after which that portion of the broad ligament between the ligature and the uterus is divided as close to the cervix as possible. The same procedure having been followed on the opposite side, the uterus can now be drawn down a good deal farther.

The top of each broad ligament, including the Fallopian tube and ovarian vessels, is now secured in a similar way, only in this case a double ligature is used, one half being tied over the free edge of the broad ligament, thus securing the round ligament of the uterus.

The tissue between the ligatures being divided, the uterus is free.

It is at times necessary, because of bleeding, to insert three or more of these lateral ligatures.

The vagina having been carefully cleansed, the swab in the pouch of Douglas is withdrawn, and the ends of the ligatures can be cut short or tied together in a bunch on each side. This latter method has the advantage that, if any oozing occurs after the ligatures have been tied, it is easier to pull down the cut edge of the broad ligament to secure the bleeding-point.

Some surgeons suture the cut edges of the vagina, and others, deeming that it is better to have drainage, do not.

Precautions in Hysterectomy.—Apart from the necessity of avoiding sepsis, the operator must be careful not to injure the bladder, bowel, or ureter, and to arrest all hæmorrhage before he finishes the operation.

The bladder may be injured in abdominal hysterectomy, especially if the uterus is being removed for a cervical fibroid, during the incision for opening the abdominal cavity, and when it is being dissected off the vagina in the radical hysterectomy. In vaginal hysterectomy, unless great care be taken, the bladder will be opened when it is being dissected off the cervix. The bowel, especially the rectum, may be injured in the radical hysterectomy when it is being separated from the vagina; and in vaginal hysterectomy when the pouch of Douglas is being opened. The most dangerous injury, and the one most likely to occur, is that to the ureter, which may be divided or tied, especially when the uterine vessels are ligated. It may be injured at the brim of the pelvis, or as it curls round the cervix below the uterine vessels. These dangers are always present, and the best way to avoid them is to have served a long apprenticeship in this class of surgery.

VENTRO-FIXATION.

This operation is chiefly indicated in cases of salpingitis necessitating the removal of the Fallopian tubes and perhaps ovaries. In such cases this operation will prevent the uterus becoming adherent to the pouch of Douglas, which is often a source of much suffering. It is also performed in cases of prolapse of the uterus and vagina in conjunction with a plastic operation on the vagina (anterior colporrhaphy and colpo-perineorrhaphy) when the uterus remains retroverted after the plastic operation, and more particularly in women past the child-bearing age.

In cases of repeated miscarriage associated with backward displacement of the uterus, this operation may be successfully employed. Even if pregnancy occurs at a date subsequent to the operation, trouble as a rule is not experienced; but occasionally this operation seems to have been the cause of miscarriage, post-partum hæmorrhage, because the uterus did not retract well, and obstruction to labour, because the cervix was tilted so far back that the presenting part was unable to dilate it.

Method.—The abdomen having been opened by a median incision, the uterus is pulled up, and two silk sutures are passed through its anterior surface and the parietal peritoneum on each side and tied. Two additional sutures are then passed through the anterior surface

of the uterus as low down as possible, and the parietal peritoneum and aponeurosis of the rectus on each side. The abdominal incision is then closed in three layers.

Precautions.—Before the abdominal incision is closed, the operator must be sure that coils of intestine are not imprisoned between the anterior surface of the uterus and the abdominal wall, since, when this has happened, intestinal obstruction has resulted.

SHORTENING OF THE ROUND LIGAMENTS.

Method.—There are a very large number of ways of shortening the round ligaments. The following is the simplest:

The abdominal cavity having been opened, a silk ligature is placed round each round ligament 1½ inches from the uterus, and the ends secured with pressure forceps. The aponeurosis 1½ inches above the pubis is then bared on each side. At this spot about 1 inch from the middle line the aponeurosis is incised with a a scalpel, and through the wound a pair of pressure forceps is forced through the muscle and peritoneum into the peritoneal cavity, and the silk ligature is grasped and pulled through the opening in the abdominal wall, and with it a loop of round ligament, the fundus of the uterus being thus brought well forward. The loop of round ligament on each side is then sutured to the aponeurosis, after which the abdominal incision is closed in the ordinary way. A modification designed to avoid the risk of subsequent intestinal obstruction and hernia is to pass a special curved forceps through the internal abdominal ring and follow the course of the round ligament to the ligature near the uterine cornu.

OVARIOTOMY.

Ovariotomy indicates the removal of an ovarian tumour. It may be one of the easiest or one of the most difficult operations in surgery. It may, indeed, be impossible to remove an ovarian tumour because of its adhesions to surrounding structures. The knowledge of when to desist in such cases necessitates great experience, and this lack of experience has often resulted in disasters of the greatest magnitude.

Method.—The abdomen is opened by a median incision. If the tumour is so large that an incision reaching nearly to the ensiform cartilage is necessary for its delivery (more especially if the patient is unmarried), the tumour can be tapped with a trochar and its contents allowed to escape before it is delivered. It is also advisable

to tap a large tumour, if there is no contra-indication, when the patient is pregnant, in which case the length of the abdominal incision is reduced.

A cystic tumour should never be tapped if there is the slightest suspicion of malignancy, if it is seen to be embryomatous (dermoid), or if it is inflamed; for if the tumour is tapped some of its contents are bound to soil the peritoneal cavity. In such a case malignant cells may be scattered, or the contents of a dermoid or infected tumour may set up peritonitis.

The tumour having been delivered through the abdominal incision, its pedicle, which consists of the ovarian artery, the pampiniform plexus of veins, the ovario-pelvic and the ovario-uterine ligaments, together with a portion of the broad ligament and perhaps the Fallopian tube, is securely tied, after which the tumour is removed by dividing the tissues between it and the ligatures, and the pedicle is oversewn or buried with a purse-string suture.

If the pedicle is too broad to allow of this simple method of removal, it must be ligatured in sections, pressure forceps having been first applied on each side of the pedicle, and the tumour cut away, after which the cut edge of the pedicle is ligatured below the level of the forceps.

If the tumour is adherent to adjacent structures the adhesions will have to be separated first, and this may be a matter of the greatest difficulty. Occasionally the bleeding due to separation of the adhesions may be so severe that it can only be arrested by removing the uterus in addition.

If the uterus is found to be the seat of a fibroid of any size it or the fibroid should also be removed.

Precautions.—The operator, having removed the ovarian tumour, should always examine the other ovary to note its condition, as bilateral ovarian tumours are not uncommon.

The precautions to be taken when tapping is thought advisable have already been dealt with.

REMOVAL OF A PAROVARIAN CYST.

Cysts encased by the layers of the broad ligament are known as parovarian cysts. They are sessile.

Method.—The method of removing a parovarian cyst consists in carefully dividing the peritoneum over the top of the cyst and then, with the fingers, separating it from the adjacent cellular tissue. The capsule of the cyst is very likely to rupture during the enucleation.

If the cyst is a small one the cavity in the broad ligament is closed by suturing the cut edges of peritoneum with a catgut suture. At times the cavity is so large that it has first to be obliterated by approximating the cellular tissue with a series of catgut sutures before the peritoneal edges are united.

There may be scarcely any hæmorrhage; on the other hand, the hæmorrhage may be very severe from a leash of vessels entering the capsule at its lower surface, in which case, of course, the vessels must be clamped and ligatured.

Precautions.—If the tumour is a large one, running towards the bottom of the cavity either on its inner or outer side is the ureter, and unless great care be exercised this tube may be injured. If the tumour is a large one it spreads over the brim of the pelvis, in which case the iliac vessels will run under its lower surface and are in danger of being wounded. At times the cyst-wall is so adherent that its capsule cannot be removed entirely. As much as possible must be removed, and the resulting cavity obliterated by a series of sutures.

REMOVAL OF A SOLID BROAD LIGAMENT TUMOUR.

Fibroids of the broad ligament are of two varieties: false broad ligament fibroids, which are really fibroids growing into the broad ligament from the side of the uterus, and true broad ligament fibroids arising in the muscle tissue of the round, ovarian, or broad ligament.

Method.—The operation of removing a false broad ligament fibroid is simply a variant of hysterectomy. It is not necessary in a work of this kind to enter into any detailed description of its removal.

A true broad ligament fibroid is removed by enucleation.

Precautions.—The operation for removing these tumours may be very difficult and dangerous. The ureter and vessels may run either under the tumour or over the tumour, and are at times in great danger of being cut before the operator is aware of the fact. In addition, a broad ligament fibroid may extend backwards, undermining the rectum or colon.

OÖPHORECTOMY.

Oöphorectomy signifies the removal of the ovaries for the cure of disease other than tumour-formation, to sterilize the patient, or to cure osteomalacia, treatment by suprarenal extract having failed.

Method.—Unfortunately, the removal of healthy ovaries is a very simple operation, and the would-be surgeon faces it with confidence, removing them for every conceivable pain, and, mistaking Graafian follicles for pathological cysts, sacrifices the ovaries on the altar of his sublime ignorance.

The ovary having been delivered through the abdominal incision, pressure forceps are made to clamp the tissue between the Fallopian tube and ovary, and the ovary is then cut away. Ligatures are next inserted below the forceps and tied, after which the abdominal incision is closed in the usual way.

Precautions.—The operator must be sure that the ovario-uterine ligament is safely secured, as it contains an artery which may cause secondary hæmorrhage unless it has been properly tied.

SALPINGECTOMY.

Removal of the Fallopian tube only is indicated in tubal pregnancy and when it is diseased and the ovary is apparently healthy, except when the patient has passed the menopause, when there is no need to conserve the ovary. It is also the best operation for producing sterility.

Method.—The Fallopian tube having been brought into view through the abdominal incision, its ampullary end is put upon the stretch, and pressure forceps are applied to the outer end of the mesosalpinx. The Fallopian tube is then freed from the mesosalpinx as far as its uterine attachments, after which a second pair of forceps is fixed to its junction with the uterus, and the tube cut off.

The cut edge of the mesosalpinx and the cut uterine end of the tube are now sutured with two or more mattress sutures, after which the abdominal incision is closed in three layers.

SALPINGO-OÖPHORECTOMY.

Removal of the Fallopian tube and ovary on one or both sides is indicated if they are the seat of disease from acute or chronic salpingitis; if there is a tubo-ovarian abscess or the tube is the seat of carcinoma. The Fallopian tubes and ovaries have been removed in cases of dysmenorrhœa when every other method of treatment has failed, and the life of the patient becomes a burden and misery. The operation may be fairly easy; on the other hand, if the appendages are very adherent it becomes a difficult and dangerous one.

Method.—The abdominal cavity having been opened, the appendages are carefully examined. They may be adherent to the rectum, intestines, bladder, back of the uterus, and side-wall of the pelvis. The omentum and intestines may be adherent to the bladder, thus occluding the appendages from view.

If adhesions are present, they have to be very carefully separated by means of the fingers, a swab, or the scissors, as the case may be. When the adherent adjacent structures have been separated and the Fallopian tube and ovary freed, the appendages are delivered through the abdominal incision, and pressure forceps are applied to the ovario-pelvic ligament at the brim of the pelvis, thus temporarily securing the ovarian vessels.

The broad ligament is now divided distally to the pressure forceps and the outer attachment of the appendage is freed. This division should extend more than an inch along the edge of the broad ligament. The remainder of the upper portion of the broad ligament is then transfixed with a double ligature, one-half of which secures the free edge of the broad ligament, the Fallopian tube, and ovario-uterine ligament; and the other half, passed round the cut edge of the broad ligament, secures the uterine branches of the ovarian vessels. If the ovario-uterine ligament is hypertrophied, it may require a separate ligature. The appendage is then cut free. The proximal ends of the ovarian vessels are lastly secured by a ligature passed under the pressure forceps.

Precautions.—Unless great care is exercised in separating the adhesions, the bowel, bladder, or great vessels at the side of the pelvis, may be injured; while, if inflammation has spread to the broad ligament and thickened it, it is very easy to include the ureter, as it runs over the brim of the pelvis, when the ovarian vessels are being secured.

It may be impossible to remove the diseased appendages or to arrest the hæmorrhage without removing the uterus. If possible one ovary or even a piece of an ovary should be saved, except in malignant disease of the Fallopian tube, when the uterus should certainly be removed also.

SALPINGOSTOMY.

The operation of salpingostomy consists in making a new abdominal opening to the Fallopian tube, the normal one having been obliterated by disease. It is indicated when a great desire for maternity is expressed, and when the tube wall is not seriously diseased and its canal is patent except at its terminal extremity.

Method.—The Fallopian tube having been brought into view, an incision about an inch long is made through its upper free border into its lumen. The patency of the lumen is then tested with a fine probe. The cut edge of the mucous membrane of the tube is now everted and united to the peritoneal coat of the tube by a series of fine catgut sutures, after which the abdominal incision is closed in the usual method.

ABDOMINAL MYOMECTOMY.

This operation is the removal of one or more fibroid tumours from the uterus, while leaving that organ and thus preserving its function.

Except in the case of pedunculated subperitoneal tumours, it is a more difficult operation than hysterectomy, and has a somewhat higher mortality, owing to the greater possibility of hæmorrhage and an increased tendency to adhesion of bowel to the suture lines on the uterus. These objections, together with the absolute certainty of freedom from return given by removal of the organ, have resulted in hysterectomy being performed in many cases in which the conservative operation might have been done. Recent improvements in operative technique have so minimized the increased risk of the operation itself that full consideration should always be given to the selection of the operation to be performed for uterine fibromyomata, and, if the woman is of childbearing age, myomectomy ought to be preferred if the conditions are favourable. Not only the reproductive function, but menstruation also, is preserved. Apart from being the necessary prelude to the retention of a fertilized ovum in the uterus, menstruation may be thought of as merely an unnecessary and tiresome phenomenon. Such a superficial view, however, loses sight of the psychical effect on the woman, as well as possible metabolic changes which its sudden cessation may produce. Some, though without any clear evidence, ascribe some internal secretion or like effect to menstruation, and attribute the nervous effects observed as the result of its sudden cessation after hysterectomy to the disappearance of such secretion. What is undoubted is, that the absence of menstruations often has a marked nervous and mental effect on the woman, and the more years there are before her before the climacteric is due, the more marked is the effect likely to be. She feels that she is different from other women of her age, that she is incapable of maternity, and if unmarried may consider that matrimony for her is out of the question. Even if one or both ovaries are left so that the general effects of the menopause do not occur, the cessation of her periods is to her the equivalent

of her having reached an age when part of her bodily functions has come to an end and that before its due season. This factor is one that must be taken into consideration, more especially in the younger women and those of highly-strung nervous temperament with introspective tendencies, in whom long periods of depression and even mental breakdown are liable to follow hysterectomy.

Myomectomy, as involving less mutilation and less disturbance of function, ought, therefore, to be chosen when the suitable conditions are present. These are as follows:

1. **General Reasons.**—The patient should be of child-bearing age and under forty or thereabouts. After forty the chances of pregnancy are slight and rapidly become more so. But even up to forty-five, if the woman herself is particularly anxious to have the faint chance of maternity—*e.g.*, if she is recently married or about to be married, and the other factors are favourable—myomectomy may be justified. Under forty, and certainly under thirty-five, and in women of the temperament referred to above, an attempt should be made to preserve a serviceable uterus whenever possible.

2. **Reasons due to Tumours.**—The number, situation, and size of the tumours are an important consideration. Naturally a single tumour is the most favourable for myomectomy, but several, even up to a round dozen, may be removed satisfactorily. But multiple tumours generally mean other seedling growths which may escape notice, and hence, when more than 3 or 4 are present, hysterectomy is preferable, unless there are strong reasons against it.

The situation of the tumour is also of moment. Subperitoneal growths are the most favourable for abdominal myomectomy, interstitial next, and submucous the least (the latter being the most suitable for enucleation *per vaginam*). The pedunculated subperitoneal fibroid is removed more easily by myomectomy than hysterectomy, and indeed most subperitoneal growths are readily enucleated. Interstitial tumours, if single or few in number, are also suitable; but if they involve the interstitial part of the tube and their enucleation, or the suture of their bed involves loss of continuity or potency in the tube, the function of reproduction will not be preserved.

Large tumours—*i.e.*, these reaching to the umbilicus or above—are rarely removed satisfactorily, as the uterus is usually so hypertrophied and distorted, and the cavity left so large, that myomectomy is not generally feasible.

3. **Reasons from Disease of Appendages.**—Disease of the ovaries requiring their removal makes myomectomy useless by destroying

both the function of reproduction and menstruation, and hence always contraindicates myomectomy. Hydro- or pyo-salpinx, or any condition necessitating removal of the tubes by interfering with reproduction, greatly lessens the value of myomectomy. Naturally any suspicion of malignant disease complicating fibroids would exclude myomectomy.

The operator must remember that, having enucleated the tumour, the bleeding may be so severe that it is necessary to remove the uterus to arrest it. The patient therefore must always be warned of this, even if the operation is undertaken with the idea of myomectomy only.

Method.

The method of removing the tumour will depend upon whether it is pedunculated or not. If the tumour is pedunculated, it is delivered with the uterus through the abdominal incision. The pedicle is then clamped with pressure forceps close to the uterus, and its peritoneum is divided on the distal side of the forceps. The tumour is then enucleated, bleeding points are secured with mattress sutures, and the cut edges of the peritoneum are united with a continuous catgut suture.

If the tumour is sessile, the peritoneum covering it and the capsule are incised, and the tumour is then enucleated with the assistance of a volsellum forceps. Any bleeding parts are then secured as before with mattress sutures, after which the cut edges of the peritoneum and capsule are sutured.

Precautions.—It is very necessary to stop all bleeding, since, although there may be only a trifling oozing at the time, serious hæmorrhage may occur later or adhesion of gut to the oozing surface.

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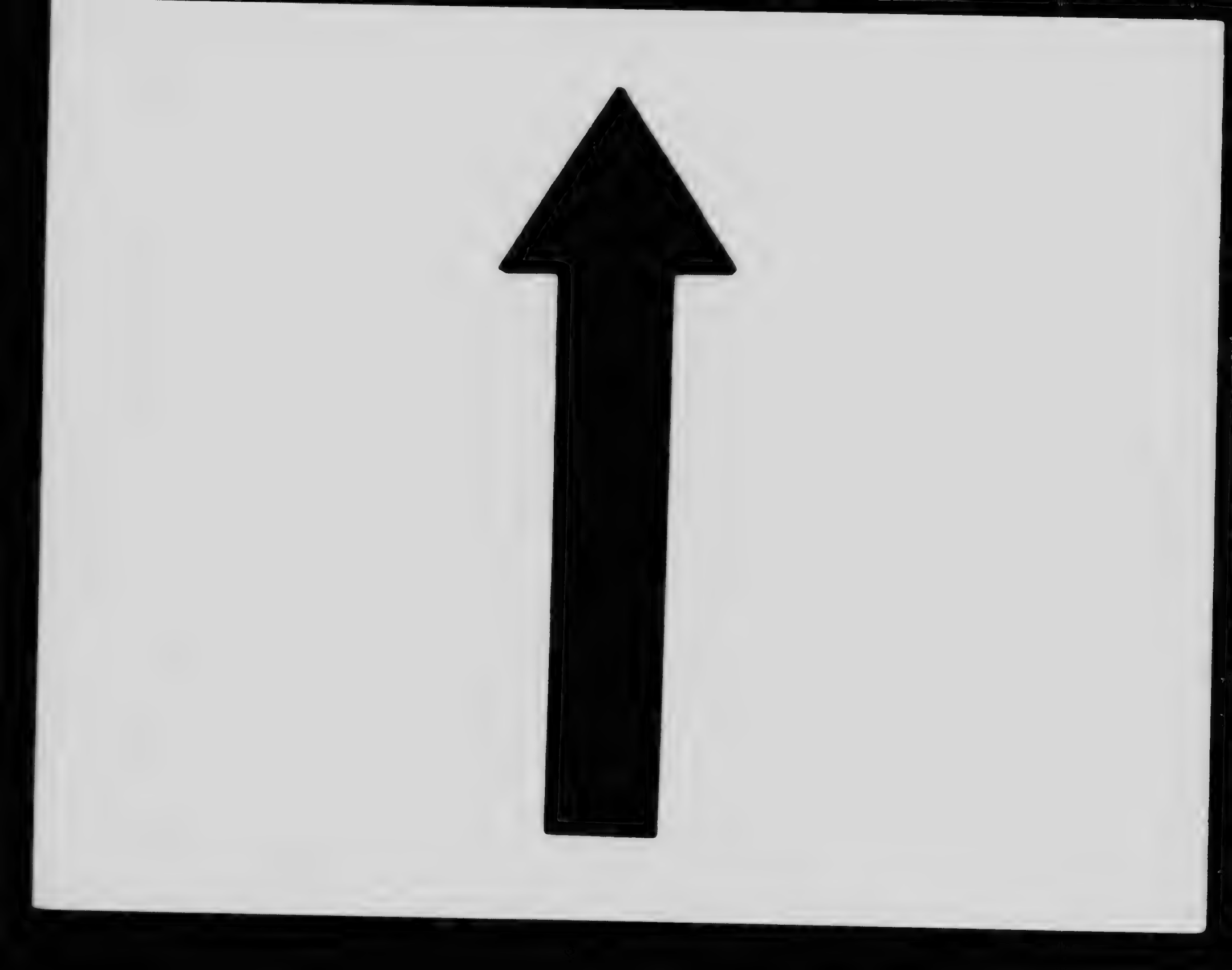

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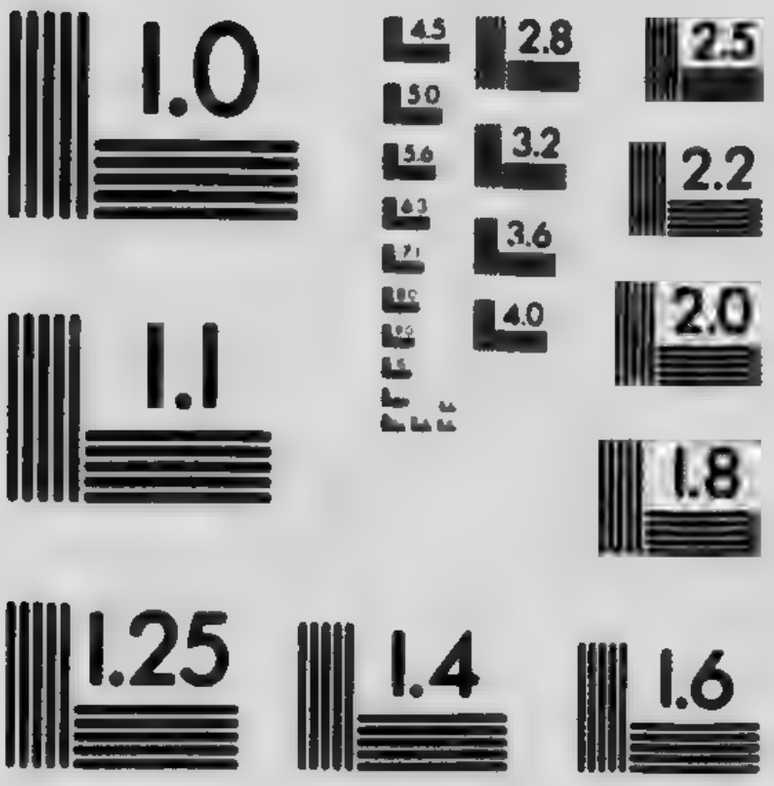

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